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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

JAMES W. WHITE, M.D., D.D.S.

Observe, Compare, Reflect, Record.

VOL. XXVI.

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Welch

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THE
DENTAL COSMOS.

VOL. XXVI. PHILADELPHIA, JANUARY, 1884. No. 1.

ORIGINAL COMMUNICATIONS.

A CONSIDERATION OF THE MERITS AND CLAIMS OF ARTIFICIAL CROWN- AND BRIDGE-WORK.

BY J. L. WILLIAMS, NEW HAVEN, CONNECTICUT.

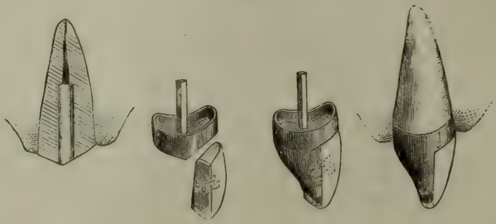
(Concluded from page 631, vol. xxv.)

As the single crown is the beginning and end of all bridge-work, a description of that particular form which is of the greatest practical value in this work will first be necessary. This is known as the Richmond Crown, although not the crown which Dr. Richmond claims as his invention. It consists essentially of three parts: a square pin of platinum and iridium which enters the enlarged pulp-canal, a cap of gold, and the porcelain face, which is the ordinary plate-tooth.

This crown is made in the following manner: After the end of the root is made perfectly smooth with corundum wheels and properly-shaped scalers, a gold ferrule or band is fitted around it. If it is desirable that this band should be entirely concealed, the labial surface of the root should be beveled a little above the margin of the gum, and after the band has been soldered it may be placed in position, and the line of contour of the margin of the gum marked upon the front of the band. The proper bevel can then be cut and the edges squared upon a corundum wheel, leaving the lingual portion of the band a little longer than the front. Pure gold, rolled to No. 34 of the standard gauge (American), is used for soldering upon the beveled surfaces, thus making a closed cap for the end of the root. A suitable tooth is now selected and backed with pure platinum or pure gold. The cervical end of the tooth is then ground to the proper position on the front bevel of the cap, all of the fitting being done while the cap is in position on the root.

After the fitting is completed the cap is removed and the tooth attached by strong resin wax and again placed in position while the wax is warm. Any slight change in position which is necessary can then be easily made. The tooth and cap are now removed together, invested, and united at the back by solder. It is well to use a solder for the cap with a higher melting-point than that used for the backing, as it obviates the danger of unsoldering the band when the backing is flowed on. After finishing and polishing the work, the end of the root is made perfectly dry, a sufficient quantity of oxyphosphate cement, mixed somewhat thinner than for filling purposes, is placed in the enlarged pulp-canal and also in the cap. The crown is then carried to place with firm, steady pressure, and held a few minutes until the cement is sufficiently hard to prevent displacement. The surplus cement which has oozed out around the band should be carefully removed and the work is then completed.

FIG. 1.



The bridge-work is simply an extension of the crowns over spaces where the natural teeth have been lost.

FIG. 2.

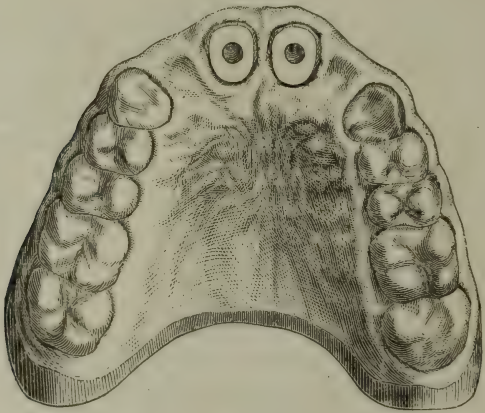


Fig. 2 was drawn from a model of a case in practice. In this case the roots of the centrals are shown prepared for the fitting of the bands, the laterals having been extracted. Single crowns are made for these roots precisely as I have described. They are then temporarily placed in position. Laterals are selected, backed, ground, and fitted to position. The laterals are then attached by means of strong wax to the centrals, carefully adjusted in the position which we wish them to occupy, and the whole removed in an impression of investing-material. An additional quantity of investment is mixed and poured over the exposed ends of the caps, and the whole allowed to harden, after which the investing-material is cut away from the backs of the teeth and crowns, and they are all united by soldering.

Fig. 3 shows the work completed, and Fig. 4 is from a model of the mouth as restored with the crowns.

Fig. 3.

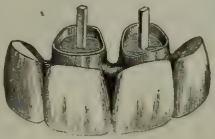
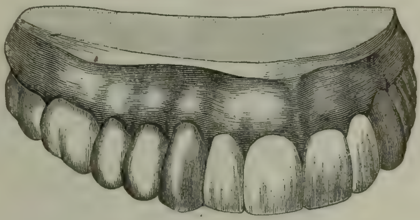


Fig. 4.



In cases where the space is occasioned by the loss of more than one tooth a somewhat different method of procedure is necessary.

Fig. 5.

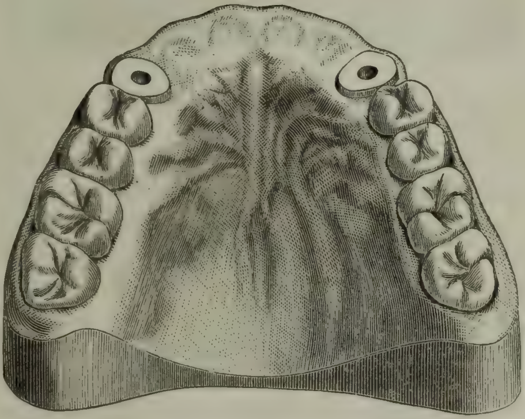
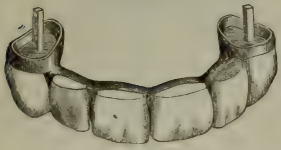


Fig. 5. shows a model of a mouth in which the superior laterals and centrals had been extracted. The canines were badly decayed, with exposure of the pulp. The first step is the removal of the pulps from the canine roots as previously described. The crowns are then fitted as already described and placed in position. An impression is then taken in plaster, the crowns remaining imbedded

on its removal. The impression is varnished and oiled, and a model of investing-material poured. After this has hardened, the impression is carefully cut away, and we have a model of the mouth with the crowns in position. A "bite" is taken and the articulation secured in the usual manner. The remaining crowns, having been backed, are fitted, and the face of the work imbedded in investing-material.

Fig. 6.



The whole piece is now united at the back by soldering, and when finished presents the appearance shown at Fig. 6.

Fig. 7.

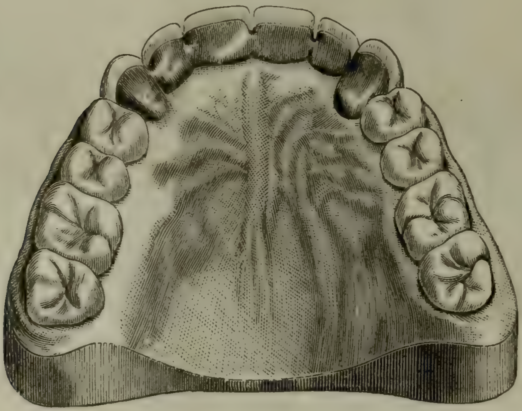


Fig. 7 shows a model of the mouth after the bridge has been cemented in place.

Fig. 8 is an illustration of a piece of this work for which there is a very frequent demand. It is for supplying the loss of the first molar and bicuspids. If the canine is intact the anterior end of the bridge may be attached by a strong band of clasp-metal passing around the canine, partly beneath the margin of the gum, so as to present the least possible exposure. If, as is frequently the case, there is extensive decay, it will be best to excise the remaining portion of the tooth and replace an artificial crown as shown in the illustration. A gold cap is then made for the second molar. If this tooth is decayed it will only be necessary to remove the decay, and the cement which is used for setting the bridge will make the most perfect filling-material beneath the gold cap. (Fig. 8.) The intervening molar and bicuspid crowns are made in the following manner: the porcelain faces, which are furnished by The S. S. White Dental Manufacturing Co., are backed with gold or platinum and the tips ground squarely off. Zinc pattern-dies, an assortment of which should be made from the grinding surfaces of molars and bicuspids, are used for swaging from pure gold a tip or cap for the protection of the porcelain face; for without this protection the porcelains would be almost certain to be broken. The concave surface of these tips is filled by melting coin-gold into them. This surface is then ground smooth and fitted to the squared surface of the porcelain face and waxed in position. Triangular pieces of platinum are then cut of the proper size to fit the sides of the tooth, waxed in position, and the whole invested, leaving the back open, which is filled with coin-gold.

FIG. 8.

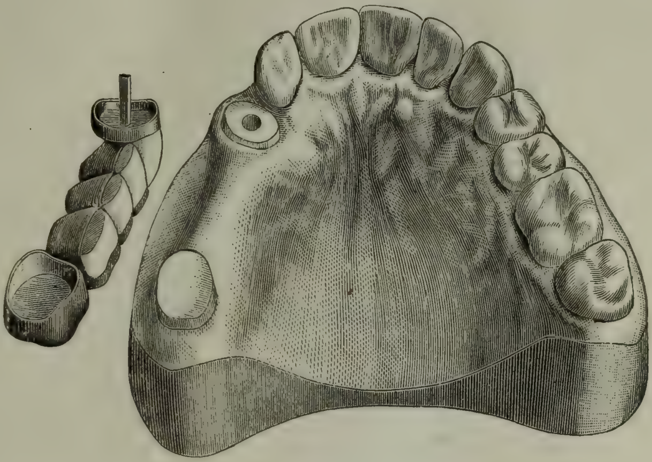
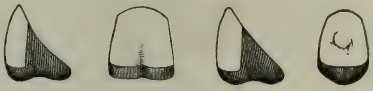


FIG. 9.



These teeth are then fitted into position in the bridge, as previously described. (Fig. 10.)

Fig. 10 shows the completed work in the mouth.

Where only one molar or bicuspid is lost, sufficient support may be gained by the cap, which is made to pass over the adjoining molar. If the first molar and second bicuspid are lost, the anterior end of the bridge may receive sufficient support from a strong spur, which may rest in the groove or sulcus between the cusps of the first bicuspid; or this groove may be deepened into a cavity, into which the spur projects and around which a filling is placed. (Fig. 11.)

The most extensive pieces of this work which have been attempted are cases of twelve and fourteen teeth upon three and four roots. Several of these have been worn for a year or more and none of which I have any knowledge shows any signs of failure.

Perhaps I cannot better close this paper than with the description of the restoration of a mouth where any attempt to remedy the ruin save by extraction would have been considered madness; and yet the lady for whom this work was accomplished is, to-day, so far as appearance, utility, and comfort are concerned, enjoying as perfect a denture as any person who has the same number of natural teeth intact.

Fig. 10.

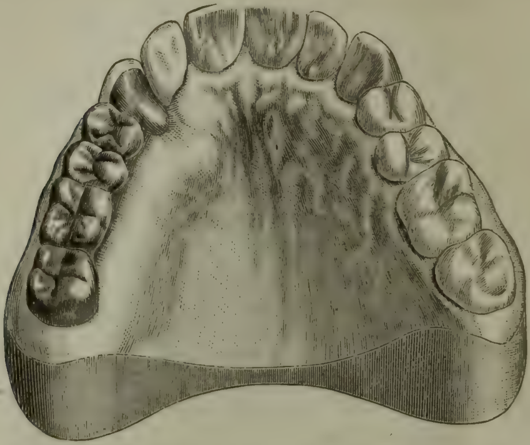


Fig. 11.

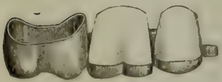
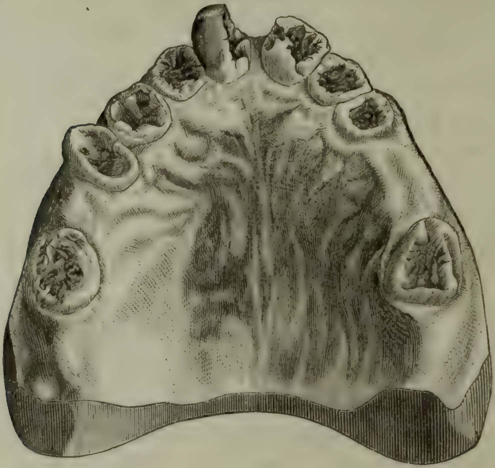


Fig. 12 was drawn from a model of the mouth as presented. Only one tooth remained the pulp of which was not exposed—the left second superior molar. In the first bicuspid, canine, and central

Fig. 12.



of the left side the pulps were exposed and in a partially putrescent condition. Abscesses had formed about the roots of the second left bicuspid, right central, canine, and second bicuspid. The pulp was slightly exposed and inflamed in the right first superior molar. The second bicuspid on the right side and both bicuspids on the left were extracted at once as worthless. The exposed pulp in the right molar was treated and capped. The partially living pulps were removed from the teeth above mentioned, the fistulous openings were healed, and all of the roots thoroughly cleansed, and plugged with orange-wood saturated with carbolic acid and glycerin. The greatest difficulty was encountered in the treatment of the right canine root, which had two large openings through the side of it, and through which projected into the enlarged pulp-canal a tumefied growth of the pericementum. For several weeks the tissues around this root were highly inflamed, and the face was several times badly swollen. The difficulty was finally overcome by covering these openings with No. 30 gold-foil, and filling the root with amalgam. Crowns were then fitted over all of the roots. A bridge was then extended from the left canine to the first molar to restore the lost bicuspids. The missing bicuspid on the right side was restored by attaching the crown to the cap which was placed over the molar containing the exposed pulp.

FIG. 13.

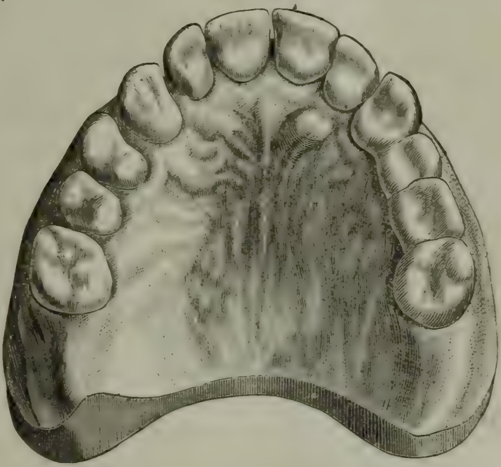


Fig. 13 was drawn from a model of the mouth as restored.

In conclusion, I desire only to repeat what I have already substantially said, that this work opens up a new field for the usefulness of our profession, which will bring joy to the heart of every conscientious dentist. Its possibilities are almost unlimited.

As the introduction of the cheaper forms of artificial work was the inauguration of an era which has been prolific of evils which may not be remedied in one generation, and which by degrading the prosthetic element in dentistry has tended to destroy public appreciation for all efforts which demand a price in proportion to the skill and art displayed; therefore, the introduction of any improvements which will tend to elevate the standard of dentistry by securing to the patient a form of denture which shall be more compatible with nature's laws, and to the dentist a more equitable compensation for his services, should receive the hearty indorsement of every progressive man in the profession.

EXPERIMENTS WITH CELLULOID AND THE NEW-MODE HEATER.

BY STEWART J. SPENCE, SAN FRANCISCO, CALIFORNIA.

The dearth of recorded observations on the nature and working of celluloid, in current dental literature, indicates the existence of a vacuum in the dental curriculum in regard to it which suggested to me the writing of this article.

Having just made more than thirty experiments with celluloid and the New-Mode Heater, I have met with some interesting facts, of which, during two years' previous use of the apparatus, I was ignorant. The main results I will now give before relating the experiments, thus inverting the usual order of placing results last, for the sake of perspicuity.

1. Plaster investments require one and a half hours to dry in the oven of the heater, with the thermometer at 400°, and half an hour more to raise their heat to 320°. Drying them over a gas-burner takes nearly as long, and loosens the plaster from the flask. A thermometer placed between the slightly separated halves of the flask in the oven indicates when this heat is reached, at which time a blank, previously prepared, should be expeditiously inserted.

2. Celluloid may be molded in from five to ten minutes at 320°; in about twenty to twenty-five minutes it degenerates, becoming brown, hard, brittle, and porous; and in twenty-five to thirty minutes it burns up.

3. Celluloid will burn at either high or low temperatures, according to the length of time it is exposed to them, as well as their degree of heat. Thus it is unsafe to leave it at even a low heat for a long time, as in slow cooling.

4. Celluloid is more liable to spoil if not under pressure, and those parts of the blank least subjected to pressure are most liable to come out damaged. Therefore flasks should be closed with all expedition.

5. Celluloid, unless worked at a high temperature, so as to flow readily, and with well-hardened plaster, will press the model out of shape, and the teeth out of position.

6. Steam brought in contact with heated celluloid makes it puff up and degenerate.

7. Plaster retains heat longer than metal, and therefore plates left in the oven to cool may spoil or burn up even when the temperature of the heater has fallen to a low degree.

8. Tin-foil discolors celluloid at a high heat, making it browner.

9. Celluloid after molding is hardest at the surface, as may be clearly seen in a plate that has been slightly over-heated, it being porous internally, but very hard on its surface.

Instead of giving a copy of my record of these experiments, which would be unnecessarily prolix, I will give a condensed account of them by series.

1st Series. *To test the heat of the oven.* I placed in the dry oven a separate thermometer, which, with the door closed, registered the same as that outside; then reversed them with similar results. Removing the central screw from the top did not reduce the temperature perceptibly. Removing the door reduced it a few degrees. Removing both door and screw caused a rapid decrease from 320° to 290°.

2d Series. *To test the heat of oven with plaster in it.* I filled a half flask with plaster and placed it in the oven, with a thermometer on the floor beside it, of course closing the door, the outer thermometer standing at 320°. After twenty minutes the inner thermometer had reached only 300°, showing the cooling effects of the plaster on the air of the oven. Moved the thermometer on to the plaster, the thermometer fell considerably, and while the outer thermometer rose in thirty minutes to 440°, the inner reached only 290°; steam was then admitted to the oven and it ran instantly up to 340°; steam was then shut off, and the outer thermometer maintained at about 360° for thirty minutes longer, by which time the inner reached 320°. At this point some steam was let off, which ran the outer thermometer twenty degrees below the inner, showing that plaster is slow to part with its heat as well as to receive it.

Further experiments were made in drying plaster, both in the oven, with steam and without it, and out of the oven over a gas-burner; also with plaster mixed with pulverized pumice, and mixed with marble dust. It was found that in the oven with either steam or dry heat, and the outer thermometer at 400°, about thirty minutes were required to dry and heat a small half flask of plaster to 320°, and about two hours for a full flask. Done over a gas-burner, under an inverted flower-pot, a little less time was consumed, but the investments loosened from the flasks; under higher heats they became burnt and badly checked. Those mixed with pumice and marble dust took nearly as long to heat and became softer than the plaster alone, and so were thereafter abandoned.

3d Series. *Testing celluloid in the oven without the presence of plaster, steam, or pressure.* A piece of celluloid placed in the oven at 320°, the heat rising, burned, after slight swelling, at 360°. A second piece remained in thirty minutes with the heat at 320°; swelled slightly, and crumbled to powder on being taken out. A third piece left in three minutes at 320° was taken out a little swollen and somewhat brittle and porous.

4th Series. *Testing celluloid in the oven with plaster and with moisture.* A half flask of moist plaster was placed in the oven, and on it a piece of celluloid and a thermometer. The outer thermometer starting from 320° rose to 440°, then fell to 360° in about sixty minutes, by which time the inner thermometer reached 320°, and the celluloid, after great swelling, ignited. (In the previous series of experiments the celluloid had swollen but about one-tenth as much as it did in these.) Next a half flask of previously dried plaster was inserted, and the inner thermometer raised to 340°, when a piece of celluloid was dropped in, and burned in five minutes. A second piece at about 330° puffed up in ten minutes, and would probably have exploded in five more, if I had not varied the experiment by admitting steam to test its effects, which were, a greatly increased swelling and then gradual shriveling to a thin wafer. (That steam does not produce ignition was also demonstrated elsewhere, when its admission ran the inner thermometer up to 340°, and yet afterwards, when the steam was shut off, the celluloid burned at 320°.) In the next test, the dry half-flask was again used, but the outer thermometer was lowered to 320°, which ran the inner one down much lower, but in forty minutes they tallied, during which forty minutes the celluloid after the first fifteen minutes began to puff, and in ten minutes more had reached full size, and then for fifteen minutes slowly shrank and then exploded.

Both thermometers being now at 320°, a piece of blank was left in fifteen minutes, and on being taken out crumbled to powder under the slightest pressure. A second blank, in twenty-five minutes at 300°, came out not crumbling so badly. A third at 280° for thirty minutes was slightly swelled and somewhat brittle and porous.

5th Series. *Testing celluloid in the oven with pressure and plaster.* A full flask of plaster was placed in the oven, and its temperature raised to that of the outer thermometer, 320°; then a piece of celluloid was placed in the flask, which was closed down in three minutes, and in five more the piece was removed from the flask in perfect condition. A second piece was then inserted, closed in ten minutes, and removed from the oven, and in five minutes more opened in perfect condition. A third piece was left in twenty minutes, and in five more opened in perfect condition, not even discolored. A fourth piece was given twenty-five minutes in the oven and ten more before opening the flask, with disastrous results; it had crumbled to a brown powder.

This fifth series of tests shows that the material in question remains perfect under pressure longer than without it. But it is to be remembered that the investment here used must have lost some of its heat while out of the oven. Later trials seem to indicate *twenty minutes as the longest time that celluloid can safely be left at* 320°. As a side-issue the cohesion of the material was tested during this series; freshly-filed surfaces were placed together, and apparently joined, but they separated under a strong strain.

6th Series. *Testing the effect of steam on the celluloid at* 320°. The same investment was used as in Series 5, and the flask closed in ten minutes, when steam was admitted. In ten minutes more the blank came out spoiled, being disintegrated, whitish, and sticky. I have seen celluloid take on this soft and white condition when heated in water above 270°.

7th Series. *Testing the flowing qualities of celluloid at* 320°. A piece of celluloid was placed in a flask heated to 320°, no cavity being left in the plaster to receive the celluloid. Closed in ten minutes. It sunk a bed for itself in the hard plaster, flowing but little. This is a hint as to the cause of misfits, raised bites, and thickened palates, of plates molded with soft plaster and low heats.

8th Series. *Testing the effects of quick closing.* A full blank was placed in a full flask of plaster heated to 320°, and closed so that the halves of the flask came together on one side considerably sooner than on the other. Gave it over fifteen minutes in the oven. When opened it showed, as expected, the side of the plate which had been the latest closed, porous and brittle. As a side-issue in this experiment, tin-foil of two thicknesses, 18 and 60, were placed side by side on the blank, and when peeled off the surface below was of a browner color than the adjacent celluloid.

I would hint at the possibility of the celluloid which oozes from the flask, and touches the wall of the oven, being ignited thereby in some instances. A deep excess-chamber should be cut around the model to prevent this. Moreover, this escaped celluloid, not being under pressure, is doubtless more liable to burn.

Celluloid hardens on being subjected to dry heat, but much of this is not desirable, as its hardness is external, while inside it becomes porous, and when thus hardened is very brittle. Celluloid will burn under water, as demonstrated in a vulcanizer at 320°.

Thin edges of celluloid will soften in hot drinks in the mouth. Thus, the festoons of gums left thin will shrink from the tooth, producing what may be termed a free edge of celluloid gum, under which dirt deposits, and shows through the semi-translucent celluloid. This is prevented by making the edges of the festoons of proper thickness. Another error frequently seen is that of cutting away the inter-dental celluloid gum (contrary to nature), thus forming cavities difficult to cleanse by the brush of the patient, and producing unsightly discoloration at those points.

The principal objection to celluloid is that after a year or two in the mouth it loses its beautiful color, and becomes of a dull vermilion shade, or even black. This will probably remain the chief objection to it. That it is not so tough nor so elastic as vulcanite, and that in consequence it wears away and loses its smooth surface in the mouth, and is unfitted for clasps, and that it is a little more difficult to work than rubber, would not prevent its popularity, if it were not for this discoloration. However, the loss of color does not always extend far into the plate, and much of it may be quickly removed with a brush-wheel and pumice.

TRANSLATIONS.

SYPHILITIC TEETH.

(Translated for the Dental Cosmos from the French of Alfred Fournier, by J. Wm. White, M.D., Lecturer on Venereal Diseases and Operative Surgery in the University of Pennsylvania, and Surgeon to the Philadelphia Hospital.)

The hereditary influence of syphilis frequently, though not invariably, affects the dental organs, and manifests itself in diverse lesions. Although all the subjects of hereditary syphilis do not present the dental malformations which we are about to describe, there are nevertheless enormous numbers in whom these lesions will be met with.* An examination of the dental organs, therefore, constitutes an important element in the retrospective diagnosis of hereditary syphilis.

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* It is as yet impossible, I believe, to determine by reliable statistics the frequency of these lesions in hereditary syphilis. I have tried to establish a record of this kind, but was compelled to give it up for the time being for the reason that in a great number of recorded observations upon late hereditary syphilis, no mention of the condition of the teeth is made. The absence of information on this point, however, does not prove that the teeth did not exhibit abnormities, but merely suggests that no attention had been paid to this peculiarity.

Cases where hereditary syphilis has been suspected, but has only been recognized through indications primarily furnished by the state of the teeth, need not be cited, being so numerous and so familiar. In many instances hereditary syphilis has, to the great benefit of the patients, been diagnosed solely through these unique dental malformations.

An illustrative case occurred in the practice of Paget: A young girl was afflicted with a serious lesion of the nose, which had been pronounced lupus, and had been treated as such. Paget, in examining this patient, was astonished to find dental malformations of a kind that are usually concomitant with hereditary syphilis. Nothing else that would lead to the supposition that she was affected with syphilis was found. Nevertheless, for this reason alone it was decided to use anti-syphilitic treatment. The supposed lupus was cured in six weeks.*

The interest which attaches to the subject of the influence of syphilis upon the teeth, and the agitation in scientific circles to which it has lately given rise, are sufficient reasons for the discussion upon which I will enter without further introduction.

The hereditary influence of syphilis shows itself in the dental system in two ways, very unequal in point of diagnostic value, viz.: First, by a retardation of evolution; second, by the arrest of growth and by modifications of structure.

A few words will suffice for the consideration of the first. The hereditary influence of syphilis causes occasionally a retardation more or less marked in dental evolution. This is a peculiarity which has been recognized for a long time. So long ago as the last century Sanchez called attention to the tardy dentition of infants born with syphilis. The same fact has been noticed since then by a number of authors, notably in our time by a most competent specialist, Dr. Magitot. I have in my note-book several cases of syphilitic children who have not begun to "cut their first teeth" before ten, twelve, fourteen, or fifteen months. This retardation of evolution applies generally to the entire denture. It has been noticed, however, to be limited, in some cases, to one group of teeth—the incisors, for example. We find it especially in the first dentition, in the reports which I have been able to consult on this subject. Some cases show that a similar retardation occurs in the eruption of the permanent teeth.

This retardation of evolution is in some instances very marked. Demarquay relates the case of a syphilitic child who, at the age of four years, had not a single tooth, and who (a most curious and most significant peculiarity from a pathogenic stand-point) could not yet walk.

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* See *Medical Times and Gazette*, 1862, No. I. p. 309.

M. Lancereaux has likewise described a "true arrest of development of dentition," in the case of a syphilitic child, who was at the same time microcephalic, idiotic, and epileptic. At the age of twelve years the lateral incisors and the cuspids hardly extended beyond their alveoli.*

This retardation of dental evolution is but a localized expression of a more general fact—viz., the retardation of development among persons affected with hereditary syphilis. The evolution of the individual—that which is commonly called the *growth*—occurs but slowly and in an imperfect manner, in the cases of syphilitic children. The dental system participates in this disposition of the whole being,—a fact curious in itself and even possessing some interest in the way of retrospective information; but it could not carry much weight in diagnosis.

Inherited syphilis implies numerous other troubles in the constitution of the dental organs which afford us more valuable means of diagnosis. For convenience of study and facility of remembrance, they may be divided into four principal groups: First, dental erosions; second, microdontism,—the reduction below the physiological average of the volume of certain teeth; third, dental amorphism—that is, certain teeth lose more or less the attributes of their proper class or type; fourth, vulnerability, the dental organs being more readily acted upon by the causes of attrition and disorganization—in other words, rapid wear, ready change, and early decay of certain teeth. Add to these four principal groups some peculiarities of a rarer kind (such as, for example, irregularities of alignment, anomalies of reciprocal arrangement, etc.), and you will have very nearly the complete programme which offers itself for our study.

It is to teeth affected in one or other of the preceding ways that the name "syphilitic teeth" is given—an incorrect term, but one sanctioned by usage. One might think that, in imitation of what is called the syphilitic testicle, the syphilitic liver or kidney, the "syphilitic tooth" should be a tooth which, having been normally constituted, had been affected later by syphilis; but what is meant by this term "syphilitic tooth," is a congenital dental malformation, originating from syphilitic influence, a deficiency of development stamped by syphilis on a tooth yet unformed, and during what constitutes, if I may so speak, its fetal life: in other words, the consequence of the pathological action exercised by syphilis upon it during its *intra-follicular* development.

A few words upon the history of the subject, before taking up the special descriptions. It was in England that the study of the influence of syphilis upon the teeth first arose, and it is to Hutchinson that the credit of originating it is due. It is in England, also, that the question has been most discussed and is most generally known. It has given rise there to a truly scientific agitation, which quickly popularized it. Among English writers these syphilitic teeth, "typical teeth," are recognized as an element in the diagnosis of hereditary syphilis. In France, on the contrary, we must acknowledge that the subject is as yet little known. Despite the remarkable works of Prof. Parrot, of Dr. Magitot, and of some of the latter's students, investigation has extended very little beyond a limited circle of practitioners more especially devoted to syphilitic diseases or to the dental art. It has not reached the general medical public, and at present we know very little of the clinical value which an examination of the teeth may possess in the diagnosis of hereditary syphilis.

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* *Traité de la syphilis*, 2d edit., p. 442.

Let us establish a few general propositions:

First, hereditary syphilis can influence both dentitions. At first it was thought, with Hutchinson, that the second dentition alone was susceptible to this influence; but it has since been recognized that the first dentition may be affected as well as the second. M. Parrot has furnished incontestable proofs on this point. In a fine specimen which he has kindly placed at my disposal,*—the dentition of a heredo-syphilitic infant aged twenty-seven months,—the two superior central incisors are strongly notched crescentally and present the most characteristic type of that which is at present described under the name of the "Hutchinson tooth."

Second, the first dentition appears to be very much less often influenced by hereditary syphilis than the permanent dentition. Where we find one case of first dentition affected we find fifteen or twenty of the second. I should state, however, that this proportion would be perceptibly modified if we took the precaution, in all autopsies of young children, to open the alveoli in order to examine the embryonic teeth. M. Parrot recently told me that in doing so he had often discovered lesions of the milk-teeth.

Third, the dental malformations occasioned by hereditary syphilis are commonly multiple and symmetrical—that is to say, we find several teeth affected, as a rule, and usually the corresponding teeth are similarly affected. If in an upper jaw the left central incisor is affected, the same condition will exist in the right central incisor. If one lower cuspid is affected, the other will present an alteration of the same nature. Such is the rule, though it is not absolute, but has its exceptions. There are cases where these malformations affect certain teeth only unsymmetrically; also where only one tooth is found to be affected. These are the unusual exceptions, overlooked for a time, but which have brought about a more careful study of the question.

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* Cast No. 48 from collection of Prof. Parrot.

These generalities established, let us now take up the particular descriptions.

Dental Erosion.—It sometimes happens that, in the description of a disease, one symptom or one lesion receives attention to the exclusion of others which are no whit less important or interesting, or which are even more important in clinical significance. As an example, dental erosion is but a part of a whole, and yet to read what has been written on the subject, to listen to the talk about it, one would think that all dental syphilis consisted in erosion,—an error against which it is necessary to protest at once. That which is called dental erosion is but one of a number of lesions—but one of the forms by which hereditary syphilis shows itself on the teeth, and perhaps, from the point which especially interests us, not the most important or significant. Under the common but incorrect name of "dental erosion" are designated diverse dental malformations, produced during the intra-follicular life of the tooth, and consisting in a peculiar alteration of the crown, which appears worn, corroded, worm-eaten, or *honeycombed* on a certain portion of its surface. One would say on seeing a tooth affected in this way that it had been cut into by an instrument or corroded by an acid. It resembles in appearance worm-eaten wood, and it is this appearance which gives it the name of erosion; but this lesion is not an erosion in the strict sense of the word.

Erosion conveys the idea of the wearing of a surface which has been previously normal; but that which is called dental erosion does not concern a tooth which, originally normal, has undergone later a corrosive action, but is the result of an imperfect formation of the tooth, the consequence of a temporary stoppage in its development. Before it issued from the gums it was the same as we see it ten, twenty, thirty years later, with such modifications only as time and functional use have impressed upon it. Such is the primordial idea which it is necessary to form concerning erosion in order not to mistake it—a common error—for the result of different pathological actions.

Let us consider the physical characteristics of erosion presented clinically under manifold and diverse forms. An indefinite number of varieties could be made if all the different forms were taken into consideration, but these are reducible to a certain number of principal types, to which the secondary forms are subordinate. Simplified in this way, the description of them becomes easier.

The different forms of dental erosion can be divided into natural groups, according as they affect the face or the free edge or grinding surface of the tooth. The first group consists of erosions affecting the face of the tooth. Several types offer themselves here. It will be necessary to recognize at least four, viz.: First, erosions "*en cupule*" (in little cups); second, erosions "*en facettes*" (in facets); third, erosions "*en sillon*" (in grooves or furrows); fourth, erosions "*en nappe*" (on the surface). Let us as briefly as possible examine into each of these varieties.

First, *erosion en cupule* (in little cups), the most simple of all the varieties and one of the most common, consists in small excavations or cups in the surface of the crown. To speak merely of the extreme types, between which are found all the intermediate ones possible, we find these cups now very small and punctiform, comparable to the slight depression which would be left by the point of a pin in soft wax; now larger, and at the same time deeper, consisting of a true excavation, rounded, concave, and analogous in appearance to the impression of the *head* of a pin in wax. The erosions *en cupule* are always very easily distinguished. They force themselves upon the observer by a double characteristic: First, by irregularity of surface, the excavations of which strike the eye. Second, by characteristic color. Except in the very young, where they are still white, they contrast with the normal color of the tooth by a darker tint, grayish or of a dirty gray; sometimes even brownish, indeed, almost black. When we study them carefully, or, better still, when we have the opportunity to submit teeth thus affected to a microscopical examination, we recognize that the lesion consists of a depression more or less deep in the dental substance. If the cupule is superficial, its bottom is still covered with a thin layer of enamel. But if it is deeper, the enamel is wanting, and the bottom of the cavity is hollowed out of the substance of the dentine. These cup-like erosions affect all the teeth. But they are more common on the incisors—notably the superior centrals. They vary in number; we may find one or many on one tooth, When several exist, they may be scattered without order, but more commonly they are arranged in a row on a horizontal line. They may be seen (but this is a very rare exception) forming two horizontal lines, one above the other.

Second, *erosion en facettes* (in facets) is a form not so common. Like the preceding, it may be met with in the different teeth, but it affects especially the incisors. Suppose that one had filed flat and at several points the anterior surface of an incisor; this surface, in place of its normal curve, would present a series of small planes, forming what we term facets. Such is about the appearance of the dental malformation in question. The tooth eroded in facets presents a surface with irregularities such as would be produced by a file or cut with a plane. One would imagine it had scaled off in places, as if a fragment had been broken from it. At first this lesion may escape observation, as it most frequently does, which accounts for the slight notice taken of it up to the present time. It can be thoroughly examined only with the aid of a magnifying-glass, first taking the precaution to dry the tooth. Without this precaution the brightness of the moist enamel often renders inappreciable the extremely superficial irregularities of the dental surface.

Third, *erosion en sillon* (in grooves or furrows), a variety designated by M. Parrot as the furrowed-like or sulciform dental atrophy, is the most common form, and consists of a linear excavation in the crown of the tooth in the shape of a transverse groove. This groove is sometimes continuous, in which case it makes the entire circuit of the tooth, like a ring; and it is often interrupted,—that is to say, formed of segments or sections which separate the healthy portions. It may even consist of a finely punctated line. That which is most important to specify is, that the groove presents itself in two forms. In the first it is linear and superficial—that is to say, it consists simply of a streak traced on the tooth much like the mark left by a pen on paper, or the groove produced by the passage of the point of a penknife on a piece of wood. The sight distinguishes this streak without conveying the idea of a depression, but the finger-nail placed on the tooth recognizes a slight furrow. In the second form we have to do with a regular *gutter*, deeper and wider than the preceding—a true furrow in the substance of the tooth, from half a millimeter to a millimeter or more in depth. One would say that the tooth had been filed, scratched, or scraped with an instrument, or corroded by an acid. The layer of enamel is partly gone, and it may so happen that the denuded dentine forms the bottom of the furrow.* Of these two forms, the first is not easily seen without attentive examination; the second produces an unsightly deformity, which strikes the eye at first sight, because the furrow soon acquires a dark tint which contrasts strongly with the white color of the neighboring surface. No matter to which variety it belongs, the furrow preserves one unchangeable characteristic, namely, a rigorously *horizontal* direction, the cause of which we shall understand in studying the pathogeny of the lesion. Commonly *erosion en sillon* consists of a single furrow, presenting the characteristics I have just described. But there are instances of a different kind, where, in place of a single furrow, we find two or three on the same tooth. These multiple furrows occupy the portion of the crown nearest to the free edge of the tooth. They are placed one above the other horizontally, like parallel lines, and are separated from one another by a band of enamel which forms a slight border between them. It was to teeth affected in this manner that long ago the significant names of "stair-like teeth," "step-like teeth," were given. Finally, let us remark that in such teeth the free extremity, which constitutes the last step, is generally worn thin, partially or totally deprived of enamel, and is rough, uneven, irregular, and brownish. It crumbles and wears rapidly, so that even in youth, or later in adult life, the tooth is shortened and deprived of its free extremity, as if it had been filed horizontally. These different varieties of erosion may affect all classes of teeth, but they are most frequently found on the incisors.

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* It may be remarked that, even at the level of the edges of the furrow, the layer of enamel sometimes causes a slight relief, in the form of a collar. This relief increases by so much the apparent depth of the furrow.

Fourth, *erosion en nappe* (surface erosion) is a rare form. It consists simply of an exaggerated form of the preceding ones. Imagine one of the erosions we have just described, increased in every way, tending to cover a large surface of the crown, and you will have the present type. The tooth affected in this manner is absolutely altered in appearance. It presents a wide, unequal, and rough zone, filled with alternating points and sinuosities, and is of a dirty yellow or blackish gray color. Still more magnify this pathological condition in extent of the lesions; imagine it general—that is to say, affecting the entire surface of the tooth—and you will then realize the monstrous type of tooth produced—completely disorganized and unrecognizable as a tooth. This is what Tomes has termed the honeycombed tooth; without doubt on account of the numerous anfractuosities presented, and which have been compared to the alveoli of a honeycomb.

A second group of the so-called surface erosions affects the free edge of the tooth. The malformations which compose this group present themselves under absolutely different forms, according as they affect different classes of teeth. It is necessary, then, to examine them separately on the molars, the cuspids, and the incisors.

Let us begin with the molars. An essential point should first be specified. In the class of molars there is but one tooth on which the influence of hereditary syphilis shows itself, and that is the first molar. We will confine ourselves at present to the mere statement, the explanation of which will occupy us later on. Here the malformation consists in a true atrophy of the cusps of the tooth (the "cuspidian atrophy" of Parrot). The body of the tooth for two-thirds or three-fourths of its height, is in a normal condition; but its upper segment, on the contrary, is lessened in all of its diameters—atrophied, eaten, as it were; separated by a circular furrow, as though it were set in it. At first sight one would say it was a smaller tooth growing out of a larger one, or better still, "a stump of dentine emerging from a normal crown" (Magitot). If we examine it more closely, we notice that the masticating surface of the tooth, instead of being neatly divided in a series of tubercles or cusps separating the undulated depressions, presents an irregular appearance, bristling with roughened elevations, granular or acuminate, filled with sinuosities, more or less deep, some of which penetrate to the dentine. Furthermore, this surface, in place of the pearl-like color which distinguishes the normal tooth, has a dirty yellow or brown tint. This appearance is that of the lesion as observed in infancy. But in time it is entirely transformed. Under the influence of mastication the grinding surface, abnormally constituted and partially deprived of enamel, wears away, and there remains a tooth doubly remarkable. First, because it is notably shortened; second, because it ends in an absolutely flat surface—a true *plateau*, with a yellowish center and a peripheral border of white enamel. This short and flat tooth has a diagnostic significance of the highest value.

Upon the cuspids, the erosion of the free edge shows itself in one or other of the two following varieties: First, as a simple notch of the cusp in a V-shaped form, similar to the cut made in a piece of wood by two convergent strokes of a knife; second, as a true atrophy of the free edge, which undergoes a marked circular cutting-out, and is reduced to a slender conical stump, which appears as if set in the body of the tooth, or as if "hafted in a cylindrical ferrule" (Parrot).

In the case of the incisors, the varieties are more numerous. It is necessary to recognize at least five. A few words will suffice to describe them. The first consists of an angular notch, identical to that which I have just described to you in relation to the cuspids. It is a cut, more or less irregular, into the free border of the tooth. The second consists in the notching of the free edge, which is formed of a series of small pointed projections, separated one from the other by a corresponding number of depressions. This is what is termed "saw-like" teeth. The third is characterized by atrophic thinning of the free edge, with antero-posterior flattening. Imagine a wax tooth to have been compressed and flattened at its free extremity by the jaws of a pair of pincers, and you will have the exact representation of this variety. The cutting edge of the tooth affected in this manner is diminished in thickness; flattened from before backwards; sometimes even reduced to a simple plate. It is, furthermore, unequal, irregular, rough, filled with transverse or vertical depressions. Its color is changed,—yellow or gray, indeed nearly black in some places. In some cases the thinning of the cutting edge becomes excessive. In a case of M. Lailler's, the free edge of a superior incisor was reduced to the thickness of two millimeters, in the condition of a simple scale of extreme thinness, to be compared to a thick sheet of paper. It is needless to say that a tooth affected in this manner is weak, friable, and easily worn or broken. At other times the appearance of the lesion is somewhat modified. The cutting edge of the tooth is not only thin,—it is irregular, as if folded, covered with vertical furrows. In a case recently observed the two upper central incisors were as if wrinkled at the free edge, being thin, sinuous, and divided at half their height by quite a deep furrow. The fourth form reproduces the general atrophy of the free edge which I have described in reference to the cuspids and molars. The tooth offers a normal base but is suddenly constricted within a few millimeters of its free edge by a circular furrow, from which emerges a small rough stump, with an uneven surface and of a dirty color,—gray or yellow.

Fifth, and finally, we come to a special type, about which there has been much discussion during the past two years. I speak of the erosion with the semi-lunar notch; also called crescent-shaped, or crescentic notch. It is that which more recently has been called "Hutchinson's tooth"—truly a legitimate name, since Hutchinson has the merit of having first described this dental malformation and recognized its pathological significance. A full description of this tooth is necessary, because of its importance.

The lesion designated under the name of "Hutchinson's tooth" consists in one important characteristic, to which may or may not be added different accessary ones. The important characteristic consists of a semi-circular cut in the free edge of the tooth. This cut is well marked in the typical form of the lesion. It encroaches upon the free edge of the tooth, following a curved line, regularly and almost gracefully arched, the convexity of which is towards the neck of the tooth, in such a manner that this free edge forms a crescent. The superior central incisors are the seat of preference *par excellence* for this crescentic notch, which by its shape and seat offers itself as a special lesion, having its own individuality. There is no other dental lesion which can be compared to it. Likewise, from a purely clinical point of view, it has its own peculiar features, which exclude all risk of confusion. It asserts itself, one might say, at first sight. It is impossible to mistake it, or seriously to consider it in connection with any other affection of the dental organs. That which objectively resembles it most is the wearing away of the dental substance caused by a pipe-stem. This also assumes a crescentic shape; but the wearing away caused by the pipe is slight except in the space between two teeth, and not on a single tooth; it is never observed on the central incisors, for the good reason that a pipe is held to one side and not in front; it is never so regular as the notch of Hutchinson, which has its center of curve corresponding in a mathematical manner to the axis of the tooth, etc. A tooth accidentally broken would not be mistaken for a "Hutchinson tooth," for a fracture is irregular and never assumes a crescentic shape.

The crescentic notch is the essential characteristic of the Hutchinson tooth; but it is not the exclusive one. There is frequently added one or other of the following peculiarities, which all, in different degrees, are worthy of attention. The dental notch is nearly always beveled at the expense of its anterior edge. In other words, the anterior border of the crescentic arch is cut obliquely from above downwards, and from before backwards, as if a chip had been detached from this edge by a cutting instrument,—an insignificant detail apparently, but really an important one, whose special interest we will notice later. The Hutchinson tooth is oftenest noticeable by its rounded angles. In the normal condition the lateral borders of an upper central incisor form with its inferior edge very sharp angles. Here, on the contrary, there is no angle, no sharp edge; the sides unite with the inferior border by a curved line. Often the Hutchinson tooth is very much reduced in length. This characteristic of shortness is very striking in some patients. Sometimes, also, it is a narrow tooth having a transverse diameter below the average. You are aware that the normal characteristic of the upper central incisors is a greater transverse diameter than that of the laterals. In the Hutchinson type of tooth it sometimes happens that they are not so wide as the latter. It is not uncommon,—and this is a point upon which the English writers have particularly insisted,—for the Hutchinson tooth to take upon itself the so-called "screw-driver" shape—that is to say, to show itself broader on a level with its neck than at its free edge. This configuration—the opposite of the normal shape—recalls very accurately the shape of that well-known tool, the screw-driver. Finally, the upper central incisors having the Hutchinson notch also deviate frequently from normality in direction, and in place of having their vertical axes parallel, they are inclined toward each other—obliquely convergent.

The features which I have just described constitute the perfect type of the Hutchinson tooth, and are best observed in youth. But this type is far from being unchangeable. It offers, to begin with, differences of degree—that is to say, it is more or less marked, according to the case. Moreover, it presents modifications at different ages; and this is of the greatest importance, as we shall see. In the first place, the Hutchinson tooth does not protrude from the gum with the clearly-cut notch which I have previously described. At the beginning this notch presents itself, either filled, or in part occupied, with small, apparently atrophied vegetations of the dental tissue. The curve of the arch bristles with these productions, in the form of little spines—serrations—resembling the teeth of a fine saw. Sometimes a larger lobule in the form of a truncated cone will be observed at the top of the curve. These are merely the remains left by the atrophic process which the tooth has undergone at the time of its formation. Deprived of enamel, non-resisting, friable, they become blunted, wear away, break off, and are very rapidly destroyed; so that after a few years they completely disappear, leaving in their place the smooth crescentic notch.

A point of true practical interest is that the Hutchinson tooth is changed in form after adolescence, and ends by losing its characteristic notch. Under the influence of functional employment the arch of the free border—the depth of the notch—progressively diminishes or shortens. A time arrives when the curve of this vault is scarcely perceptible. Finally, all trace of the notch disappears, and the free edge is transformed into almost a straight line. Let us be precise. From the age of twenty to twenty-two years the vault is notably diminished. At twenty-five years it becomes nearly flat. But at this time there still remains, at least for a while, a particular sign which enables us to recognize the lesion. It is the bevel of the anterior edge of the tooth. Remember that the Hutchinson notch is cut from above downwards and from before backwards, at the expense of its anterior border. This bevel is naturally not affected by the general wearing of the tooth until the last; so that it remains still easily recognizable when the notch has disappeared. It thus constitutes a final vestige of that lesion. I saw to-day a fine specimen of this kind. The patient was born of syphilitic parents, and has been affected with the different symptoms of hereditary syphilis. She had certainly (her testimony on this point is very clear) her two superior central incisors strongly notched. But that disappeared with age, she affirmed; and now, having reached the age of twenty-five years, she presents but a faint vestige of this old lesion, in the form of a sharp bevel of the anterior edges.

Such is Hutchinson's tooth at the age of twenty-five years. Beyond this age the bevel in its turn disappears, and nothing remains of the primitive malformation, unless it is a shortened tooth, which has no further significance. So that it has been truly remarked that beyond the age of thirty years there is no such thing as Hutchinson's tooth. This dental malformation is marked not only on account of its shape, but also, and to an equivalent extent, by its location. Thus, first, in a manner which we may almost call constant, it has for its location the superior central incisors of the second dentition; second, it not less commonly affects the two teeth in precisely the same manner, symmetrically; third, it often happens that it affects them in an exclusive manner—that is to say, as a rule, the notched erosion is met with on the two central incisors, and the other teeth do not participate in this order of malformation, though perhaps exhibiting malformations of another kind. It is curious, for example, to meet alongside of notched central incisors the lateral incisors free from all notching.

Having determined the rule, we must make note of the exceptions. Each of the three propositions which I have just formulated has its exceptional cases, which we are compelled to mention. The Hutchinson notch is observed not only on the superior central incisors of the second dentition; it is met with on the same teeth of the deciduous set; it is seen sometimes in the second dentition on teeth other than the central incisors, viz., the upper lateral incisors, the inferior incisors, even (but rarely) the cuspids. It can affect in different degrees the two superior central incisors, or it may affect only one, the other remaining intact. Cases of this kind are very rare, to be sure, but Legros, Clark, Hutchinson, and Moon have each cited well-authenticated examples. I have in my notes a similar case, where one of the central incisors was entirely normal while the other presented a perfect type of the crescentic notch.

Several classes of teeth can, at the same time with the central incisors, present the type of the crescentic notch. I have now a patient, son of a syphilitic mother, and affected with specific symptoms of congenital origin, who presents different malformations of the dental organs: among others well-marked notches, first, on the superior central incisors; second, on the two inferior central incisors; and third, on the cuspid. Likewise, in the mouth of a young patient of twelve years, lately shown me by my colleague and friend, Dr. Besnier, there are recognizable very fine Hutchinson notches upon the two superior central incisors, as usual, and also upon the four inferior incisors.

Such are the various forms of what is termed dental erosion. After having described them individually, it remains for me to add that they rarely present themselves in an isolated manner. Thus, nothing is more common than to recognize in the same subject dental erosions of different types on different teeth—here grooves, there depressions or facets, elsewhere angular notches or cuspidian atrophy. Two or three varieties of erosion tend to multiple combinations. The Hutchinson notch, which in this respect is an exception to the common rule, very often constitutes an exclusive lesion. There is nothing astonishing in the habitual coëxistence of these different forms of dental erosion. They are in effect but varieties of one and the same lesion, and though they assume different objective appearances, they arise from one and the same morbid process. Thus, as has been forcibly said and demonstrated by M. Magitot, dental erosion is a uniform pathological condition, and the differences which it presents are but variations.

(To be continued,)

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PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION—TWENTY-THIRD ANNUAL SESSION.

THIRD DAY—*Morning Session, continued.*

(Continued from page 651, Vol. xxv.)

SECTION II., Dental Education, was called, and the report was read by Dr. C. N. Peirce, chairman, as follows:

In reviewing the educational field, we find subjects which have in previous years claimed the attention of this association still unsettled; but advanced steps have been taken which awaken a new interest, and give great promise of a flattering and bountiful harvest. The most important of these is the formation of the national organization of the State boards of examiners. This body, called into existence within the last few months, has for its object the promotion of a high and uniform standard of dental education; this work it hopes to accomplish through the local State boards of examiners. Organized by the adoption of a constitution and the election of officers, it becomes an important factor in the promotion of dental science; especially as it already embraces in its membership representatives from nine State boards. Its efficiency in this work will, as stated above, be through the influence it may be able to exert upon the State societies and their boards of examiners.

That this American Dental Association may more fully realize and appreciate the efforts of this new ally we append a few of the resolutions which were considered and adopted at its late meeting:

Resolved, That this National Association of State Boards of Examiners enjoin its members not to accept the diploma from any college which does not require two full regular courses of lectures, or its equivalent, one full course and five years' practice, previous to granting such degree.

Resolved, That this association insists that boards now connected with this body shall not confer degrees or titles of any nature.

Resolved, That this association recommends to the State societies of all States where no law exists, the necessity of an immediate effort for such legislation.

Resolved, That this association furnish all State societies with a copy or copies of a well-digested law, so that uniformity in legislation, as far as practicable, may be attained.

Thus you see that the work already undertaken by this new organization is in a line with much of that which has in previous years claimed the attention of this Section.

The subjects of the most efficient means of obtaining a dental education and of the requirements which should be exacted from the student by the various educational institutions before granting a dental degree, are still eliciting much discussion and varied opinions. There are some members of the Section who maintain that were a medical degree first required before the student commenced the studies pertaining especially and only to his specialty, great advantage would accrue by virtue of this enforced culture. Others maintain that the medical and dental studies can be pursued simultaneously, the student electing from the medical curriculum the studies which are common to both; while others again maintain that in an exclusively dental school an education is secured which contributes most to the needs of the dentist, and hence promotes more thoroughly the culture and advancement of the dental profession.

The views expressed by members of the Section regarding the course or extent of study to be required previous to graduation are not less varied than those on the means of obtaining the education: some contending that two full courses, with previous training under a preceptor before examination and graduation, is the only legitimate method to secure the highest degree of proficiency, while others maintain that five years' previous practice is quite equivalent to the first year of college instruction; and two of the Section have expressed the opinion that faculties are quite justified in giving the student an examination whenever he may request it, without reference to the time of study pursued in their institution, they believing that their duty to the public and the profession was fully accomplished by this means of obtaining a knowledge of the acquirements or proficiency of the applicant. It was the opinion of a large majority of the Section that this latter method was liable to many abuses and fraught with much danger to the best interests of the profession.

The sentiment of the Section was best expressed by the passage of the following resolution, which they recommend for your consideration and adoption:

Resolved, That the interests of the profession, and advanced dental education, both demand that all dental educational institutions shall require that every student, before being admitted to examination for the degree of doctor (or master) of dental surgery, shall have taken two full courses of lectures or its equivalent.

Dr. J. Hayhurst, Lambertville, N. J. We have not heretofore had the facilities for acquiring an education such as should be at the foundation of every professional calling in the land; but a new influence has arisen—the organization of the National Association of Dental Examiners. The various State boards have heretofore been, as it were, at loggerheads, and have not given and received reciprocal favors as they should have done. But now that the members have come together they understand that they are all working for the one object. If, by bringing our views together and comparing them, we can found a system of dental education that shall avoid the errors of the past, we shall have done a great work to-day.

Dr. J. N. Crouse moved the adoption of the resolution presented in the report.

Dr. W. H. Atkinson objected to the resolution because of the ambiguity involved in its use of the word "equivalent;" besides, it simply names a degree that ought not to be regarded as a degree. He was aware that he had advocated the granting of a certificate of progress to those competent to receive it, or to have one degree cover the whole ground. We all know that we have to fight the ignorance that is in ourselves before we are prepared to fight that which prevails around us. The report shows the incompetency of those making the investigations upon which it is founded when it says they were estopped because a proper preliminary education is not required. He was opposed to the adoption of a resolution whose ambiguity might lead to the very errors it sought to avoid.

Dr. Peirce moved to strike out "or its equivalent."

Dr. Allport thought the portion relating to M. D. S. should also be stricken out.

Dr. Hayhurst presumed that that portion referred to the effort made in New Jersey at the last session of the legislature to have the power to grant the degree M.D.S. conferred upon the State board. The movement was defeated, but he understood another attempt was to be made.

Dr. Barrett thought that in order to a clear understanding, it would be well that he give an explanation of the degree M.D.S. as conferred by the New York State board. It was the child of Dr. A. Westcott. It was not intended to represent any scholastic training; it was simply a door opened to the older members of the profession in the State, who had no means of obtaining a dental education through which they could have evidence of their regular standing. The candidate must show that he was in reputable practice as well as qualified. No man who was traveling about and not living in accordance with the Code could obtain it. That the power lodged in the State board of censors had done good he was thoroughly convinced, but it was his opinion that such a measure would now be defeated if submitted to a vote of the profession of the State, because it was not in accord with the spirit of the other States, and because it antagonized interests which they did not desire to antagonize.

Dr. Allport moved to strike out all reference to the degree M.D.S.

Dr. C. S. Stockton, Newark, N. J., hoped that his brethren in New York would go to the Legislature for another law that shall take away the power to grant this degree, so that the smaller lights will not be tempted. We don't want any such degree. We have a degree that means "doctor of dentistry." He was glad to see this resolution presented and he hoped it would be passed unanimously, so that no State board would hereafter attempt to confer a degree.

Dr. T. L. Buckingham, Philadelphia, did not wish to appear as opposing dental education in any way, but he wanted it to be placed on the broad basis of equality. According to the terms of most of the colleges the student must attend two years before coming up for examination; the State boards will examine one who has not attended a dental school a single day and give him a certificate. Is this placing them on an equality? These examining boards are well known and their decision is respected, while their certificate is esteemed an absolute qualification. He would not give much for a final examination alone as a test of merit, owing to the difference in men, and he thought that the granting of certificates by the State boards was contrary to the interests of the highest education. A young man can stay at home and pursue his studies, going from time to time to the neighboring dentist, and after awhile he goes before the State board and is passed; but if he comes to college he cannot be examined for two years.

Dr. Peirce, in explanation of the report, said that there were four or five conflicting views expressed in the Section, and the resolution was drawn as read, first, to command a unanimous vote in the Section, and second, in order to draw out just the expressions that have been evoked. He hoped it would be adopted as amended.

Dr. Barrett. If the resolution is passed as amended no man can come before the New York Board of Censors unless he has the degree D.D.S.

Dr. B. G. Marcklein, Milwaukee. We have, in our State, under loose corporation laws, two institutions from which any man can obtain a diploma for $12, whose diplomas will be recognized by the resolution as it stands. He would like to have the word "reputable" inserted before "dental educational institutions."

Dr. Allport could see no use in the amendment, as public sentiment would provide against the evil which it sought to remedy. So far as the institution at Delavan is concerned, it is too rank to have any standing here.

The resolution as amended was adopted.

Dr. M. L. Rhein, New York, offered a resolution recommending that the colleges require a thorough preliminary education of all matriculates. Lost.

Dr. Peirce offered a resolution to the effect that this association deems it adverse to the interests of dentistry for any State board to confer a degree. Adopted unanimously.

Dr. Barrett believed that New York would come into line as indicated by the resolution.

Dr. J. N. Crouse, Chicago, hoped that in a year or two the national organization of the State boards of examiners would be strong enough to compel the colleges to make attendance upon two terms necessary to graduation, and not allow five or even ten years' practice to be an equivalent for one course. This all the colleges will have to do, or men will go to those that have such requirements in order to avoid the tortures of the State boards. The present state of educational matters in dentistry is not a credit to us. Even the mechanical trades have better regulations for the training of their apprentices than we have for our students.

Dr. Buckingham asked if it would not be better to pass a resolution to the effect that no professor in a dental college shall be a member of a State examining board. It seemed to him that the duties of the two positions were incompatible. The college requires two years' attendance; the State board none at all.

Dr. F. H. Rehwinkel, Chillicothe, O. Many persons have the impression that the State boards and the colleges are incompatible, that there is a conflict between them, forgetting that when a college graduates a man it confers a distinct honor; while the State boards do not: they give a simple certificate of qualification to practice dentistry. The State boards do not inquire where a man got his education. Their business is simply to find out if he knows enough about dentistry to practice without imposing injury on the people through his ignorance. When a college gives a degree, it not only inquires as to the technical qualifications of the candidate, but it wants to know if he is morally qualified. The State boards are the best friends the colleges have; they are a most powerful agency to drive young men seeking to enter dentistry to the colleges. We in Ohio are now waiting for the time to come when we can go before the legislature and ask for a law prohibiting anyone from practicing unless he has a diploma from a reputable college.

Dr. Peirce wanted to say one word about the origin of the State board in Pennsylvania. When those having the bill for the regulation of dentistry in charge went before the committee of the legislature to which it had been referred, they were met with the statement that it was too exclusive, that it would be burdensome on those intending to enter dentistry, because it would force them to attend college. The bill could not be passed until a compromise was made by the provision for a State board of examiners, whereby a means was supplied for the admission of those who for any reason could not attend college. The law has been a benefit. Every year brings us nearer to the time when the State board can be abolished. The public recognize that there is an advantage in the man who has taken the regular course of study. Since the organization of the State board in Pennsylvania, forty-six candidates have appeared for examination, of whom fifteen have been passed. Of these, four have since attended college. Of those who were refused the certificate, several have taken the college course. The State board at the time of its creation was a necessity, and it must still remain so, but the organization of the National Association of Dental Examiners will have a remarkable influence in the several States.

Dr. W. W. Allport, Chicago, said that all knew his feeling for the colleges and his loyalty to this association, but after all he looked on the State boards as really destined to become the regulators of all our dental colleges. Why or how can they become the regulators? Take the example of Illinois. Our State medical boards say who shall practice medicine,—what colleges shall be recognized. Now, if the dental examining boards will recognize what colleges are doing faithful work for their students, the cause of dental education will be greatly promoted. The Illinois State board does so. A diploma from Delavan is worth no more to it than so much brown paper. He did not think the State boards could be abolished; they are needed as regulators of education.

Dr. Hayhurst. There is an important difference between a college diploma and the certificate of a State board. He had been a member of the New Jersey examining board since 1873, and he believed the examining boards were an important adjunct to the work of the colleges. So far as he was personally concerned he never allowed an opportunity to slip to advise the young men who apply for the certificates to attend college. If the certificate was granted it was no use outside of New Jersey. The men who are selected for examiners are usually chosen because of their supposed efficiency, and he believed that, as a rule, they did their duty. At the last session of the New Jersey board there were six candidates, of whom two were passed, two were held in abeyance, and two were rejected; and that was about the proportion generally.

The report was adopted as a whole, and the subject was passed.

The committee to take action on the death of Dr. Goddard, late president of the association, reported a suitable memorial, which was adopted by a rising vote, on motion of Dr. McKellops.

The report of the committee on the death of Dr. W. H. Allen was likewise adopted by a rising vote, on motion of Dr. Butler.

Section III., Dental Literature and Nomenclature, was called, and the chairman, Dr. Taft, stated that they had received several papers, the gist of which was incorporated in the body of the report, which was then read.

[We reserve the report for publication hereafter, with the intent to offer some editorial comments thereon. It is proper to state that its publication in the *Dental Register* was unauthorized, and in open disregard, by the chairman of the Section—the editor of that journal—of the right to first publication which for a valuable consideration was granted to us by the association.]

Dr. W. H. Atkinson, of the Section, also read a paper, of which the following is a synopsis:

Dr. Atkinson's paper was a plea for correct nomenclature. Like literature in general the text-book and journal literature of dentistry is not always a truthful presentment of the degree of advancement in the knowledge considered. It is in the main the "product of beginners, in the enthusiasm of fresh attainments, and is full of adventitious and irrelevant, not to say unripe, conclusions. The juveniles and the conservative memorizers of exploded texts by far exceed in numbers and quantity in their contributions to text and journal literature those who give us really instructive and reliable articles. Correct literature involves correct nomenclature, and this, to be correct, must adequately describe the objects which are the subjects of observation. These subjects consist of things and concepts of things, and their behavior or activities. * * * It is clear that our knowledge of these is an ever-advancing series of perceptions of things and their functions, as revealed through their perceptible movements as individuals and as masses, whereby we are enabled to classify and record them, and thus to save those who come after us the time, patience, and labor it cost us to attain them." Little appreciation had been manifested of efforts heretofore made to convince this body of the inadequacy of effete methods of teaching, because of a bad lead, initiated and maintained by a bad text and effete literature. If then, dental literature is a diseased weakling, by reason of the dim perceptions of facts and incompetent nomenclature to record even these, shall we longer succumb to a blundering external authority of past intellections, by following the leadership of the blind, or shall we not rather assert our own right and ability to insist upon comprehending both the facts and the philosophy of which our literature is to consist? To do this we must get away from the mere vaporings of dimly perceived propositions in physiology, pathology, and therapeutics, and record in literary perspicacity, by a well-selected terminology, the ever-advancing revelations in dental literature. * * * To have the best literature we must have the ripest editors to select and publish it. * * * Dental literature, to be useful to the world, must so instruct readers as to enable them to comprehend and apply the doctrines and methods recorded in its pages. The absolutism of text-book and journal literature takes it for granted that the positions taken are impregnable and final; while everything pertaining to functional activity is in a mist so dense as to ignore the only study that can reveal the molecular metamorphosis upon which it depends. The questions put forward for settlement are such as to reveal the utter lack of perception of the points at issue—namely, "Germs or Acids—Which?" is the caption of a paper upon the "etiology of decay," thus making concomitants pose as antithets, etc., etc. * * * The current literature of physiology, pathology, and therapeutics is ambiguous, not to say dishonest. The muscles are said to move, the brain to think, and the glands to secrete; the heart to circulate the blood, the stomach to digest, etc., etc. Food, poison, and medicine are said to act on the organism. Would it not be better to say that the various functions which together constitute physiology are operated *in* the various parts where they appear, rather than *by* the *organs* in which the elaboration of function in nutrient, poisonous, or remedial manifestation takes place? When this mode of expression is urged in discussions, the reply is, "well, everybody knows that is what is meant." It is just this sort of quasi meaning that is the point of interest and contention.

Dr. Crouse thought that the writer of the report did not comprehend what he (Dr. Crouse) regarded as the scope of the Section on Dental Literature. The report of the Section should, it seemed to him, take all the new books pertaining to dentistry, and give a synopsis of them, so as to enable us to get at the kernel, instead of having to go through so much trash as we should many times have to do, rather than limit its work to defining words and criticising the language used in the journals, or dwelling on the number of journals and the proportion of dentists who read them. There are not over ten thousand dentists in the United States, and of these more than one-half take at least one journal. He thought one of the greatest barriers in the way of dental education is that we have too many journals. Every institution, every college, every depot that wants to advertise, starts a new journal. Better one good one in which all the matter worth reading could be condensed. As it is, there is much in them that is absolutely detrimental to practitioners, and much that he would prefer that students should not read. He hoped that the journals would strive to give the essence without so much husks.

Dr. Abbott was fond of facts, and fond of having them "boiled down." The number of practitioners is variously stated at from 10,000 to 11,000; one depot puts it as high as 12,700. The Dental Cosmos alone is furnished to 4,500 men in America, and there are eighteen other journals in this country which are taken by a great many men who do not take the Dental Cosmos. He thought fully one-half of those practicing dentistry were taking some journal. He believed the demand for literature was growing, and that the journals would do better even than they had done.

Dr. T. T. Moore, Columbia, S. C., thought the journals were doing a good work, and that their influence and circulation were extending every year. He would like Dr. Crouse to suggest a method by which they could be made to publish nothing but what we ought to read.

Dr. Crouse said he had been trying to get the Section to do that.

The subject was passed.

The Committee on Voluntary Papers reported favorably a paper by Dr. E. Parmly Brown, Flushing, L. I., on "The Past, Present, and Future of Dentistry."

Dr. Brown not being present to read his paper the association adjourned till 8 P.M.

Evening Session.

The special order, the election of officers and the selection of the next place of meeting, was taken up, with the result given in the September Dental Cosmos.

The roll was called for the formation of the Sections.

Adjourned.

(To be continued.)

NEW YORK ODONTOLOGICAL SOCIETY.

The New York Odontological Society held a regular meeting at the house of Dr. Charles Miller, 331 Madison Ave., Tuesday evening, October 16, 1883. The meeting was called to order at 8 o'clock, the president, S. G. Perry, in the chair.

The death of Dr. T. L. Buckingham was announced, and eulogistic remarks were made by Drs. Abbott, Lord, Kingsley, Francis, and John B. Rich.

Incidents of Office Practice.

Dr. Jarvie, Jr. I brought with me this evening the model of a lower jaw, the impression of which I took in the early part of the summer. It is a case of hypertrophy of the alveolus. The growth is exceedingly large, as you see, and has become very annoying, taking up a great deal of room in the mouth, and affecting the articulation very materially. I thought I would bring the model and ask the opinion of the members as to what they would do in a case of this kind. Usually the advice would be, let it alone, but in this case the growth has already become very annoying and it is yet enlarging.

While you are examining the model I would like to relate a case, the history of which is as follows: I first became acquainted with the lady some fifteen years ago, she being then about sixty years of age. She had no teeth in the lower jaw, the submaxillary gland on the left side was enlarged, and stood up as large perhaps as my thumb, and about as hard. She told me that at times it was rather painful. I have seen her frequently during the past fifteen years. In the early part of last June she came to me with this gland still more swollen, quite painful, and pus exuding from the mouth of the duct. She told me that on three prior occasions she had had similar trouble; but, supposing that its treatment was rather within the province of a surgeon than that of a dentist, she had called upon a surgeon, who poulticed and otherwise treated it, and that in the course of time the pain and annoyance had ceased; but the swelling remained about the same, possibly getting a little larger. A fear that it would develop into cancer was constantly in her mind, and was a perpetual nightmare to her. I probed the duct, and met with quite a hard, rough substance, about half an inch from its mouth; I passed the probe along this substance for perhaps three-eighths of an inch further, my probe being in the duct almost an inch. I thought from the first that it was calculus, and, after studying the case for a day or two, I made up my mind to remove the substance. By having my assistant place his thumbs under the jaw and press against it, the gland was forced upwards; having passed my probe into the mouth of the duct, and pressing the substance up against the muscles, I cut downwards, making an incision of about an inch in length, and after some trouble and using considerable force, as it seemed to be thoroughly embedded in the muscles, I removed this stone. This is probably three-quarters of it, some parts of it being lost. The weight of it at the time of its removal was thirty-six grains; it was an inch and an eighth in length and an inch and three-eighths in circumference. So far as I can learn it is one of the largest stones on record that has been taken from that gland; the lady being between seventy-five and seventy-six years of age when it was done. The wound healed nicely within ten days, the patient coming to me twice a day during that time so that I might probe the duct and keep that open rather than have a new opening form where the incision was made.

Dr. Kingsley. Dr. Harvey says he took out a stone larger than that one, although it was from another place.

Dr. Harvey, of Buffalo. We have one in the office, not taken out by myself but by Dr. Woodin, several years ago, from the mouth of a colored woman, at the angle of the jaw; it is about that length, and half or three-quarters of an inch across.

Dr. Jarvie. Taken from the gland?

Dr. Harvey. No; but from a fold in the mucous membrane, and attached to the wisdom-tooth.

Dr. Jarvie. I think I have seen larger pieces than that removed when they had been attached to the teeth.

The subject of the evening, "Prevention of Decay and of Irregularities" was then taken up.

Dr. Abbott. It seems that the executive committee of this society have an idea that a world of work can be done in an evening, or rather in an hour or two. "The prevention of both decay and irregularity!" Think of it! Think of what volumes might be written upon this subject,—volumes, perhaps, of sound sense, too; because almost every case presents some features that are a little different from any other; there is something about each one that is peculiar to itself; and each requires, in some particular, a different treatment. Of course it is impossible for two such vast subjects to be any more than touched upon in one evening's meeting; therefore, in opening this discussion I shall confine myself to general rather than special points.

I would prefer, Mr. President, to begin with a child of two and a half to three years of age, a time when the temporary teeth usually are all in the mouth. The first thing which I consider to be of the highest importance and a feature that we should insist upon, is that of absolute cleanliness, as far as it can be attained. If that is accomplished on the part of parents, or those who have the charge of a child, there will be less work for the dentist to do. It is well known that from the age of two and a half to six years there is a change going on in a child's mouth. Before going further, however, I would state that upon a late occasion (I think it was the evening of the 24th day of April last,) a paper was read before this society in which certain "directions" were given for the treatment of the teeth of children, for the purpose of preventing decay. In those directions there are some points that are, I think, worth considering. After going over a great amount of ground, the gentleman states: "When the first denture is well in place, with Arthur disks, appropriate files, chisels and burs, I thoroughly separate the teeth and maintain that condition by the approximal arch and lingual bevel."

Mr. President, I can hardly conceive of such work as that in a child's mouth; I can hardly conceive of any man making such a statement as that, to say nothing about doing such things. How long do you suppose a child would sit in my chair, or in anyone's chair, with an Arthur disk running in its mouth, or the "appropriate files, chisels," and other things described here, cutting away at its teeth? And, supposing the child would submit to it, it seems to me barbarous and altogether unnecessary. It is a well-known fact that at the age of two and a half years the teeth of a child usually stand very close together; but at the age of three and a half years you will notice a little separation; at the age of four and a half a little more of a separation will be observed; and at the age of six years the teeth will stand apart, in most instances, a sixteenth of an inch in the front of the mouth. That being the case, and it being the effect of the workings of nature, is it necessary to use an "Arthur disk," or "appropriate chisels and files," to produce that condition, or to maintain it by "the approximal arch and lingual bevel?" It seems to me that such work is unnecessary. I have practiced dentistry twenty-five years and a little over, and I have never yet seen a case where I would feel justified for one moment in attempting any such treatment. I will agree with this gentleman that the best materials to fill children's teeth with are amalgam and gutta-percha, and for the reason that they can be applied so easily and so readily to the walls of the cavity of the tooth. I do not believe it possible to do with children in New York what is claimed can be done with them in Western cities—as in Chicago, for instance, where I am assured they have no hesitancy in putting a rubber dam on the teeth of a child of from three to six years of age, and then hammering in gold. If that is the ordinary practice, they must have very robust children indeed in Chicago. That sort of practice would not do with our patients here, so far as my experience goes; and to me it is a harsh and unnecessary thing to do.

I think the very best way to preserve the teeth of children, to prevent decay and irregularity, is to treat the children as kindly as possible. The dental chair is not an agreeable place for a grown person,—many adult patients dread it; but to place a little child there, who comes into the office crying as though its heart would break, wild with excitement and fear, expecting that the dentist is going to tear its little mouth to pieces, and then to take an Arthur disk and grind away at its teeth, and file or carve them with "appropriate files and chisels," in order to separate them, so that they shall not decay, and to prevent irregularity, is entirely contrary to my ideas of proper treatment of our little patients.

Between the sixth and seventh years we find the two central incisors in the lower jaw getting loose, and very soon they either drop out or are taken out. A few months later the central incisors above get loose, and it becomes necessary to take them out. From six months to a year later, the lateral incisors will follow the same course. We now have a condition presented which is very interesting to the intelligent dentist, and usually as distressing to the child's parents,—one that would seem to be rather distressing to the gentleman who wrote this paper, judging from the manner in which he treats that kind of case. He says, "About the sixth year important events occur, and the drama of change begins. The first to fall out of line are the lower central incisors, fast followed by their correspondent teeth. While these are taking leave their permanent substitutes arrive, and back of all, quite unobserved, four memorable molars come. These are nominated well from their period of eruption; and by reason of inherent weaknesses should have our earliest care. And now the lower and upper permanent laterals appear, rearing quite likely on those they should replace. When this is so, extract the temporaries and let the permanents come in. If still sufficient room has not been gained, the deciduous canines must be removed."

"The deciduous canines must be removed!" In all the long years that I have been practicing dentistry I have never before heard any man in the profession advocate such treatment of a child's mouth. When I first read it my astonishment knew no bounds. Soon, however, astonishment gave way to charity, for I concluded the gentleman's head must be a little turned.

Now, what is the result of this extraction? Here are teeth taken out of the mouth at about the seventh year which should remain until the eleventh at least. At so early an age the permanent canines have developed so little that the roots of the temporaries have hardly been absorbed at all. The result is that the four incisors become regular, it is true, but in so doing the space from which the canines have been removed is partly occupied by them, and the remainder has been filled by the first temporary molar; so that at the age of ten or eleven, when the permanent canines should come, there is no room for them, and they crowd themselves through the gum usually outside the arch, forming one of the most unpleasant appearing and most difficult irregularities we have to deal with.

This, Mr. President, is preventing irregularity with a vengeance, is it not?

So soon as the jaws are large enough the first, or sixth-year, molars come into place. The growth of the jaws depends upon the development of the teeth, and, in the front of the mouth, the position they assume while developing.

The first molar of the temporary set is the next to be shed after the lateral incisors, usually about the tenth year. In the meantime, if the temporary canines have been undisturbed, the four permanent incisors will very nearly have regulated themselves. The effort of nature to produce its perfect type is often sufficient to accomplish all that is desired. When the first temporary molar is removed, there is more room than is required for the first permanent bicuspid, which takes its place. Whenever it happens, therefore, that the incisors have not become regular, they force the canines back sufficiently to accomplish that end. Then, as I before stated, at the age of eleven, the canines are removed, and the permanent successors soon make their appearance. They require a little more room than the temporary ones occupied, which is forthcoming in another year, by the shedding of the temporary second molars, the spaces of which are soon occupied by the second bicuspids, which as you know are very much smaller. The pressure of the lips upon the canines, is generally sufficient to force them "into line." In so doing the first bicuspids are pushed back into the extra space the former temporary molars occupied. At, or about this time, the second molar (permanent) presents itself, and thus we have at the age of twelve years, all the teeth in the mouth, and regular, except the third molars, which are due, at almost any time from the eighteenth to the fortieth year.

The gentleman subsequently says, if any regulating is necessary, *extract*—that means extract the first molars. In fact the whole drift of this "gardening" effusion is aimed at these teeth. I very much regret that I was not present at the reading of this paper before the society, in order that I might have protested at that time against its going before the profession as the voice of the New York Odontological Society, for I consider it bad teaching and bad practice.

Dr. Lord. Mr. President, it was supposed that this subject would be one of very great interest, and that every person present would want to join in the discussion of it; it was supposed to be something that would appeal to every dentist, particularly to those who have children of their own; they would say what they would do with their teeth in the way of prevention; and those who have no children of their own would say what they would do with the teeth of the children who should be brought under their care.

Then it was proposed that the subject should cover the whole range of prevention. I thought to say a few words, but I have been over this ground somewhat rather recently, and some things that I may say will be measurably, at least, only a repetition of what I have said before.

Of course in order to accomplish the most we must begin very early, and the first thing to do is to secure cleanliness. I suppose the teeth should receive attention very soon after eruption, and if its importance was understood or appreciated, it would no doubt be found that the teeth of very young children could just as well be washed and kept clean as their faces and hands. The brush cannot be so well used; it is awkward and unpleasant to a child, and it is not required; in fact other things are altogether better as a means of cleanliness both for children and grown-up persons. The brush is useful in keeping some parts of the teeth clean and polished, but it cannot be brought into contact with those surfaces which are most liable to decay for the want of being kept clean, and it is certainly most unfortunate that it is so much relied upon.

I recommend the wiping of the teeth with a cloth for very young children, and also the use of a suitable stick with powdered pumice to polish the labial and buccal surfaces. But the approximal surfaces will need the most care. I have sometimes felt, and I think that I notice it more and more, that the brush does about as much harm as good. The gums are destroyed at the necks of the back as well as the front teeth, and in not a few instances the enamel is brushed away and the teeth furrowed at the necks so as to require filling.

We ought to correct the popular fallacy that the tooth brush is the thing that is required to prevent decay and the only thing. In my opinion a soft brush is the best, using a little soap with it, and it should be considered in the main only as a means of washing the mouth. I believe that the deciduous teeth may be and should be separated to a greater or less extent, as a means of prevention, and the food lodging in the spaces would be a less evil than to allow the teeth to decay.

But I have felt that decay on the approximal surfaces of the first teeth could be prevented—that is, those surfaces could be kept clean and polished, and so decay for the most part be prevented—if an instrument of the proper shape and thin enough for the purpose,—such as I will show you,—should be passed between the teeth once a day. It may be said that this is impossible when the teeth are crowded. I believe, if it should be commenced as soon as the teeth are erupted, the passing of a hard substance between them daily would prevent a crowded condition, as well as keep the surfaces polished.

This means of securing cleanliness might be objected to, owing to the delicacy of the instrument and its liability to break. Of course it would require careful usage. I have furnished it to some mothers, and it has been very much liked. The use of floss silk must be regarded as the best and most practical means of cleansing the approximal surfaces, when the teeth are in contact; but I think if the instrument was once tried it would be found to be practicable and often more readily used than the silk. The silk should be heavy, such as I have to show you, and we may use it double with better results.

Now, if the means of cleanliness that I have named are good for the temporary they are as good for the permanent teeth. The habitual use of the silk between the teeth will not always secure such cleanliness as to prevent decay. I am now speaking of the permanent teeth. It is useful, as I have said, as a means, but it cannot always be passed, owing to the tightness of the teeth together. Just here a little shaping to relieve that tightness will be of immense service, and I regard this as one of the most important means of prevention.

I must still advocate suitable separations of some teeth as a most effective means of prevention. I believe in it thoroughly. I have seen its good results, but it must be done rightly and at the right time. Of course, all teeth do not need to be separated or shaped in order to facilitate cleanliness, nor do all teeth need any attention whatever in the way of cleansing as a means of prevention, nor will any local or mechanical means prevent some teeth from decaying, owing to imperfect formation in particular parts of the teeth, or to the general weakness of the tooth-structure, and abnormal systemic conditions.

I think some have prescribed constitutional treatment, and very likely it will yet be found, when we come to better understand the varied abnormal conditions, that some such treatment will be more or less effectual. I am able to say but very little in regard to the constitutional or systemic conditions or treatment, but it is very much to be hoped that those who are familiar with that view or aspect of the subject will enter heartily into this discussion.

Another means of prevention is the extraction of some of the teeth, in order to allow the others to fall apart more or less, and thus relieve the approximal surfaces, and so facilitate cleanliness. I firmly believe that we try to save too many of the teeth, and yet I would wish to be very cautious and very wise in the selection of the teeth to be removed. Each case must be judged of by itself, and yet there are certain principles and results that we must look to and respect. To start with, of course we wish to select the teeth that are the least important. Unfortunately we can seldom do this, for the reason that they may be much less broken down by decay than others that are more important but cannot be preserved with certainty.

I suppose the wisdom-teeth, so called, are the least important in all the row; but we cannot wait for them if early extraction is required as a means of prevention. Then the next least important, in my judgment, are the twelfth-year molars. But we cannot often take these away, because the teeth forward of them are generally so much more diseased; but if the general conditions are such as to allow the extraction of these teeth, we get the very best results. We at once keep an unbroken row. The wisdom-teeth come forward and take the place of the twelfth-year molars, and so a continuous row is maintained.

The sixth-year molar has been and is still the "bone of contention." We cannot always keep it. It comes to us all broken down and we are not left to choose. The case is decided for us. But I consider that it is the most important tooth of the whole set as a grinder, and as a supporter of the first tooth forward and the two teeth back of it in their natural positions. The loss of the sixth-year tooth, involves the loss of so much of the tissue of the alveolus, that the adjoining tooth and wisdom-tooth fall over or tip so much that they are a good deal shortened, and hence the whole bite and features are shortened; also, quite a portion of the masticating surface is lost by the tipping. Then unquestionably the teeth that are changed in their natural position from the loss of near or surrounding structure, never after have their natural firmness. The removal of this tooth has somewhat the effect of the removal of the keystone of an arch, as it bears something of that relation to the other teeth.

As I said, its preservation is often beyond our control; but when it can be preserved it ought to be considered sacred, and have bestowed upon it our very best endeavors. Instead of this, very many of these teeth are sacrificed which might be kept through life, or as long as any of the teeth. Again, if we find this tooth very much decayed and broken, and if the teeth forward of it are not much crowded, I feel that it is better to preserve a part of the crown,—as we can do,—and so keep the roots to maintain the adjoining teeth in their upright position, at least until the twelfth-year molars are fully developed and get their natural occlusion, which will more or less prevent their tipping and shortening, and so prevent undue force and wear upon the front teeth. I consider it far better as a rule, unless the teeth are greatly predisposed to decay, to separate and shape so as to secure or facilitate cleanliness, rather than extract, as a means of prevention.

It is a fine point or line between the prevention and the arrest of decay. So in speaking of the former I have somewhat gotten over on to the latter. In endeavors to arrest decay I feel that it is wiser very often to extract or break off some of the teeth, in order to secure with more certainty a sufficient number.

On the question of irregularity, it has been my observation that great harm is done and much irregularity caused by the undue extraction of the temporary teeth. As a rule—or at least almost a rule—it is better to leave the matter to nature. Some care and watching is not infrequently required to prevent the superior incisors from locking inside of the inferior incisors, and we can often correct this by filing off the temporary teeth.

The permanent incisors often come in a very crowded condition. This is unavoidable, and it is certainly better to let them remain so, rather than extract the temporary canines to give relief. It is well understood that those teeth are among the last to be shed, and the consequences of the removal of them before the appearance of the permanent teeth to take their places are lamentable, indeed, and it is incredible that some still recommend and practice their removal. Keep the temporary teeth in as long as possible, and even after the crowns are broken off keep the roots.

To correct irregularity of the permanent set, I believe that it is best mostly to allow the crowded condition until all the teeth are pretty fully erupted, then extract as circumstances may require.

Dr. Bödecker. I am very glad to hear Dr. Lord speak against the extraction of the cuspids; for I have, unfortunately, in my memory several cases of irregularity which I can attribute to nothing but unwise extraction, especially of the lower cuspids. I am also glad to hear that Dr. Lord does not advocate the removal of the sixth-year molars in every instance; and I believe that no rule can ever be laid down to cover this matter, because almost every case that comes into our hands requires different management and different judgment.

But I have to differ somewhat from both Dr. Lord and Dr. Clowes in regard to the filing of teeth. Gentlemen, from a scientific standpoint it is utterly wrong, because the enamel is removed by the filing; and what lies below the enamel? We find there the most sensitive places of the whole dentine—what is called by Tomes the granular layer; and sometimes at the boundary between the dentine and the enamel we meet with protoplasmic enlargements which are so extremely sensitive, that in drilling a tooth you do not cause so much pain anywhere else in the dentine as you do when the instrument touches the boundary of the dentine and the enamel. If this part of the tooth is exposed by the removal of the enamel, you not only have sensitiveness, but, as a general rule, decay will inevitably follow; and where decay does not follow, the exception is certainly due to the great density of the dentine. A few months ago I saw a case of this kind—that is, an exception to this rule. The patient was a gentleman of about twenty-two years of age, and the teeth in his mouth had been beautifully filed and polished. I asked him if he had any pain after the filing. He replied, "Not the least; they are just as comfortable now as they were before." In this case the teeth were extremely dense. But I have seen some other cases, perhaps eight or ten of them, in later years, in some of which I had to rebuild the teeth; and every one of those eight or ten patients had a great deal of trouble in mastication, and pain during thermal or chemical changes; and all of the filed surfaces that have not been restored by filling, will, sooner or later, have to be filled.

Therefore, gentlemen, I am of the opinion that the separation of teeth by filing, cutting, etc., is generally very injudicious, and only advisable in very dense and hard teeth; and these, in my opinion, do not need separations so much as soft teeth do. But, however carefully they are filed, they will in most instances decay again; and I think we cannot improve very much upon nature.

Dr. Lord. In the separation or shaping of the teeth I do not take away much of the enamel,—not more than half of it. It is astonishing how little is required to be removed in order that the teeth may be kept clean; and the object is to so condition the teeth that they may be readily kept clean; we aim to make such separations as will be self-cleansing, and no harm be done. We would take away perhaps half of the enamel; and we remove it at points where there is no attrition upon it, and if half the original thickness remains there it is sufficient to protect the dentine from sensitiveness. It is astonishing to see how little cutting is required, even in the front teeth, to accomplish the object. The change in shape will not be noticed, because we make the teeth of the shape that we find to be favored by nature, which is smaller at the necks and touching at the points. Therefore, the objections of the gentleman, on the ground of making the teeth sensitive, do not apply to the separations that I advocate and practice. If decay has extended through the enamel into the dentine, we cannot arrest its progress by separations, except where the teeth are very hard and dense in structure; then there will be very little sensitiveness, as has been said, and the dentine is so hard that the secretions of the mouth will not act upon it so as to cause decay.

Dr. Harvey. I would like to make a suggestion in regard to the cleanliness of teeth and the method of keeping them clean. I advise my patients to use a syringe. The ordinary syringes are very troublesome to use, so I devised, some time ago, an instrument for the purpose. It is in the shape of a syringe, but instead of having a piston the piston end is closed, and there are two little points on the side for the attachment of rubber tubes, one to be carried to the cold-water faucet and the other to the warm-water faucet. By means of this instrument a small stream of water, of the desired temperature, can be carried between the teeth, keeping them perfectly clean. The children can play with it, and will soon learn to use it, and nurses can be instructed to clean the children's teeth with it. Some patients use the syringe, but it is a great deal of trouble; they have to fill it several times in order to carry a stream between all the teeth, and after a time some will tire of it. I have never had this instrument perfected, but it seems to me to be a good thing. I have applied to different dental depots to get them to manufacture it, but no one has ever agreed to take it up. They probably think there is not enough money in it. I also advocate, as probably you all do, the use of powdered chalk after cleansing the teeth; I instruct my patients to cover the teeth with the chalk and allow it to remain two or three minutes.

Dr. Lord. I have a patient who is nearly seventy years old, and who has been under my care about five years; she has her whole set of teeth, and not one of them decayed on approximal surfaces. I asked her in the beginning if she had ever cleansed her teeth between them in any way. She said no, she had never used anything between the teeth at all. But she has literally brushed them to death, so much so that I was obliged to fill several of them on the labial surfaces. Then I have an old Scotch gentleman who has furrowed his teeth all around on the labial and buccal surfaces by excessive brushing, so much so as to require filling; and yesterday I had three members of the same family in my office whose teeth are very much furrowed from the same cause.

Dr. Abbott. It appears that the majority of people who cleanse their teeth at all, brush them with a very large, stiff brush, that will cover both the teeth and the gums with one sweep. The cross motion is the only one that can be made with such a brush. This, they think is all that is necessary. The consequence is, the gums are irritated and recede, the necks of the teeth become cut or grooved, and sometimes even the enamel is brushed off; besides when the brush gets half way back in the mouth its excessive size prevents it from going further, and the back molars are not touched at all. I instruct my patients in the style, size, and use of the brush, and what kind of dentrifice to use, and how and when to use it. I think it is as much my duty to do so as it is to do my work carefully and properly. I am talking to my patients almost constantly about the importance of keeping their teeth clean, of what can and should be done with tooth-picks, silk, etc.—in short, anything I can suggest for the purpose of keeping particles of food from remaining on the teeth and between them. An up-and-down motion of the brush, lengthwise of teeth, is the proper way of brushing them, where it can possibly be done.

The President. How often do you recommend patients to use powder?

Dr. Abbott. Once a day.

The President. At night or in the morning?

Dr. Abbott. In the morning after breakfast, for the reason that the patient becomes habituated to a clean and polished surface of the teeth, and if anything lodges upon them in the middle of the day from eating, it will be detected by the tongue or lips and they will remove it. I recommend them to brush the teeth at night again with simple water. I use as a dentrifice, a powder composed of French precipitated chalk, a little soap, coloring-matter and flavoring. There is friction enough in the chalk to cleanse the teeth nicely, and all the soap that is necessary.

Dr. J. Smith Dodge, Jr. I have listened with much edification to the discussion this evening; but I have been wondering all the time where the gentlemen get patients who are willing to go through all these processes every day to keep their teeth clean. I have some patients who use floss silk regularly, and I have a great many who could not possibly be persuaded to do it regularly; and I very much doubt whether a good deal of this precept that we have listened to does not refer to exceptional cases in the practice of the gentlemen who have instructed us. I think there needs to be something said about what you can get a business man to do, who is not so very anxious about the condition of his teeth as his wife and daughters are about theirs, but who still desires, in an off-hand way, to take pretty good care of them. There are a great many such people in New York, and a great many boys at boarding-school, and there are a great many ladies who imagine they are pretty cleanly, to all of whom I think harm is done by making the process of keeping the teeth clean appear so very formidable. I do not mean to object to anything that has been said here to-night, but I should not like to have some of my patients listen to such a discourse as we have listened to, and go away thinking they must go through all those processes; they would almost prefer to lose their teeth. A moral is pointed by a remark made by a friend in my office: "What can be the reason that my teeth are decaying again? I have cleaned them every day, and used floss silk continuously; what is there that I can do to keep my teeth from decaying?" The idea being that there *is* something that the patient can do every day that will insure exemption from decay. I always make it a point to tell such people: you are to keep your teeth clean by all the means you can employ, but you are not to expect that your teeth will be exempt from decay It is given to very few residents of New York to go through life with teeth that do not decay, whether they take much or little care of them. Now, I hesitate to seem to suggest to those who are older and wiser than I am; still I have seen a great many teeth, and have seen a great many efforts, successful and unsuccessful, to keep them clean, and it seems to me that, however we may talk among ourselves here, we should lay stress in talking to our patients upon the means that are already in vogue, so they will know what you mean. Everybody knows more or less about brushing the teeth, every person understands it, it is an established thing, like washing your face and brushing your hair.

There is one other means of keeping the teeth clean which I think is of a great deal of importance, and that is the use of tooth-picks. If I can get a patient of mine to brush his teeth as I think they ought to be brushed, and to use a tooth-pick as I am sure a tooth-pick ought to be used, I believe that person is very fairly provided with the means which he—I speak particularly of our own sex—will understand from the start to be good, orthodox, effectual means of cleaning the teeth, and means that he is likely to practice right along day after day.

It is a mistake to suppose that the teeth of babies cannot be brushed. We have raised some babies in my house, and it was always a rule, from the one who is now studying dentistry down to the last one, that as soon as there were two teeth in the mouth brushing should begin. One tooth may be supposed to be cleansed by the lips and tongue, but as soon as there were two teeth there was a brush to be used. And instead of being a disagreeable process, the tooth-cleaning business was always the biggest frolic of the morning for the babies, both that and their morning ablutions. Just put a brush in the baby's mouth and shake it two or three times around these two teeth, and it begins to like it, and it shuts its mouth and sucks on it, and, when you take the brush away, is glad to have it to use again. Friction on the teeth of a child at that age is very grateful to it; and the baby feels that it is part of a grand frolic, and likes it. That is the theory, and that is the practice in my family. Habits are easily formed at an early age, and by following this plan you form one of the most important ones,—the habit of brushing the teeth.

In regard to tooth-picks; it is my personal practice to buy the smallest tooth-picks, made of the thinnest quill. I buy them by the bundle and put the bundle in my pocket, and it takes one or two tooth-picks a day to keep me going. I have seen people take out gold cases that open upon hinges, having a nice tooth-pick inside, and, after using it, wrap up this quill as carefully as a lady would her diamonds. My quill tooth-picks are to be used once or twice and thrown away. They are thin and slender, and it is the blunt end that does the work. If any of you have teeth that are pretty close together, especially the molars and bicuspids, which are not easily cleansed, I think that if you will provide yourselves with some of these delicate thin tooth-picks and take the blunt end and pass it down between them, you will feel conscious of cleansing those places with the ease that nothing else affords.

The tooth-pick and the tooth-brush can be recommended to everybody with some feeling of assurance that they will be used, for they have the sanction and name of orthodoxy, which goes a great way. Time out of mind picking the teeth and brushing the teeth have been good orthodox methods of cleaning them. I think I can get ten persons to clean their teeth by these means where I could get one to use the sticks that have been recommended, or floss silk; or those charming little instruments of Dr. Lord's, that are good for so many things: but I should be afraid to have my patients drawing them across their teeth.

Dr. Lord. They are not to be used in that way.

Dr. Dodge. But will they not be? The tooth-pick I speak of finds space. I believe it is important to furnish to our patients means of dental cleanliness that shall be simple and easily understood, means that they not only can practice, but that they are likely to practice. These complicated, labored things will, I am afraid, scare off the persons who need them most.

Dr. Harvey. I do not like those tooth-picks you speak of, because they are too limber. I get a large tooth-pick and shape it so that I can work it in between the teeth. Those I use are tough, and you can scrape them and make them very thin and smooth all around, so that they do not catch between the teeth. Patients who have used them say they never thought of using a tooth-pick as they do these. I think it is because we get this stiffness at the shank, while they are very thin at the point, from being scraped down.

Dr. Dodge. I have never used them; but these little ones that I spoke of I find answer very well; I find they go through between the teeth very easily. When I have used one I throw it away and get another.

Adjourned.

MARYLAND AND DISTRICT OF COLUMBIA DENTAL SOCIETY.

At the last annual meeting of the Maryland and District of Columbia Dental Society, October 24, 1883, the following officers were elected to serve for the ensuing year: H. C. Thompson, president; Albert Price, vice-president; F. F. Drew, recording and corresponding secretary; W. G. Foster, treasurer; J. H. Lewis, reporting secretary; H. B. Noble, H. M. Schooley, and B. Holly Smith, executive committee.

F. F. Drew, D.D.S., *Secretary*,
198 N. Howard Street, Baltimore, Md.

MASSACHUSETTS DENTAL SOCIETY.

The nineteenth annual meeting of the Massachusetts Dental Society was held in Codman & Shurtleff Hall, Boston, Mass., December 13 and 14, 1883.

During the second day's session the following officers were elected for the ensuing year: D. M. Clapp, president; J. F. Adams, first vice-president; S. G. Stevens, second vice-president; W. E. Page, secretary; E. Page, treasurer; R. R. Andrews, librarian; G. C. Ainsworth, Leon Rideout, J. S. Hurlbut, H. A. Baker, and E. F. Whitman, executive committee.

W. E. Page, *Secretary*,
Room 11, Studio Building, Boston, Mass.

DENTAL DEPARTMENT OF THE UNIVERSITY OF CALIFORNIA.

The second annual commencement exercises of the Dental Department of the University of California were held, in connection with those of the Medical Department, at the Baldwin Theatre, San Francisco, Cal., on Thursday evening, November 13, 1883.

An address on behalf of the Dental Department was delivered by Professor C. L. Goddard, A.M., D.D.S.

The valedictory address in behalf of the graduating class of the Dental Department was delivered by W. E. Price.

An address on behalf of the Alumni Association of the Dental Department was delivered by G. W. Sichel, M.D., D.D.S.

The number of matriculates for the session was twenty-six.

The degree of D.D.S. was conferred on the following members of the graduating class by W. T. Reid, A.M., President of the University.

John Nelson Blood,
Charles Boxton,
Maria A. Burch,
Edwin Overton Cochrane,
Russell Hopkins Cool,
Milton Francis Gibbs,
William Edmund Price.

EDITORIAL.

BRIDGE-WORK.

THE style of artificial dentures which is known as "bridge-work" and which of late has come to the front, is likely as is usual in such matters to divide the dental profession into three classes—extremists at either end and conservatives in the middle. The pages of the DENTAL COSMOS are open to well-written articles in advocacy or in condemnation of the various devices and methods embraced in this practice, leaving its readers to determine their advantages and disadvantages.

Dr. J. L. Williams, of New Haven, Conn., has contributed a valuable paper on the subject, the concluding part of which appears in the current number. Dr. J. L. Williams, of Boston, puts himself on record in the following note:

TO THE EDITOR OF THE DENTAL COSMOS—

DEAR SIR: To correct any misapprehension, I wish to say in regard to the so-called "bridge-work," now somewhat discussed, that from observation of a variety of fixtures of that sort since 1844 to the present time (some of them very skillfully made) I do not recommend as cleanly and wholesome in the mouth any extensive appliance that cannot be removed daily for cleaning. And I consider as unpardonable the practice of cutting off crowns of good and useful teeth merely to use their roots for supports of a "bridge."

Very truly yours,
J. L. WILLIAMS,
1 Mt. Vernon Street., Boston, Mass.

December 12, 1883.

THE DENTAL COSMOS FOR FEBRUARY.

WE have the pleasure of announcing that we shall begin in the February issue the publication of a series of illustrated papers on "Embryology," by Dr. J. L. Williams, of New Haven, Conn. That number will also contain Tables of Temperament and its Indications in the Teeth, prepared by Dr. Eben M. Flagg and Professor J. Foster Flagg. These tables will, we are sure, prove of great value to those engaged in dental prosthetics, affording them a basis for the selection and adaptation of artificial teeth to meet facial requirements. The translation of Fournier's paper on "Syphilitic Teeth" will be continued in the February and March numbers.

BIBLIOGRAPHICAL.

A TEXT-BOOK OF INORGANIC CHEMISTRY. By Prof. VICTOR VON RICHTER, University of Breslau. Authorized translation of third German edition, by EDGAR F. SMITH, A.M., Ph.D. With eighty-nine illustrations on wood and colored Lithographic Plate of Spectra. Philadelphia: P. Blakiston, Son & Co., 1883. 12mo., cloth; price, $2.50.

The reception accorded to Prof. von Richter's book abroad has been almost phenomenal. Since the present translation was undertaken the third German edition has been exhausted and a fourth one published. A translation of it into Russian has reached a second edition and translations of it have been made into Dutch, Swedish, and Italian, all in a comparatively short time. The principles of chemistry have undergone such a marked change during the past twenty-five years and the methods of investigation are so modified, especially in the domain of organic chemistry, that the treatment of the subject from a new stand-point becomes necessary, based upon entirely new conceptions of the fundamental or inherent properties of atoms and the structural characteristics of molecules.

This text-book is written in the light of the present advancement of the science. A short introduction contains the definition of chemistry, a list of the elementary bodies, the principles of conservation of energy and of matter, chemical symbols and formulas, the constitution of matter and a brief section on crystallography.

A systematic consideration of the facts of the science from which the theoretical ground-work is deduced as the student proceeds, enables him to grasp both fact and theory as they stand related to each other, in every instance. This plan has necessitated an arrangement of the order of consideration of the elements somewhat different from that employed in the older books. The arbitrary division of the elements into metals and metalloids gives place to a new order based upon the periodic theory of Mendelejeff and Meyer, by which they are considered in single natural groups of similar chemical deportment. Hydrogen is studied first and then the halogens, together with their hydrogen compounds and combinations with each other. The atomic hypothesis, the inherent properties of atoms, the laws of constant proportions, of gaseous volume and molecular combination, are treated before oxygen and the oxygen group of elements are considered; after the oxygen group the nitrogen and carbon groups are taken up. Meyer and Mendelejeff's theory of the periodic system of the elements, which has excited so much interest and thought since it was enunciated, and by means of which not only the discovery but also the atomic weight and many of the physical characteristics of Gallium were predicted, is fully presented in its relations to each of the other elements, and as stated in the preface is the basis upon which the work is written. The metals are next treated of, their physical properties, especially their specific and atomic heats, according to the theory of Dulong and Petit in its relation to atomic weight, etc. This is followed by a consideration of their chemical properties and combinations with the non-metallic elements and with each other. At the end of the volume is appended a table showing the heat of formation of many of the more important chemical compounds, a feature which is new with this edition. As a text-book for students it is marred by the fact that the translation is evidently a literal one, as shown by the number of German idioms and the awkward construction of many of the sentences. As a consequence it has not been rendered into good, clear English. The meaning of many portions is so obscure that to the ordinary student they would be totally incomprehensible. The proposition by which the diatomicity of the hydrogen molecule is established in this work requires a capacity for abstruse reasoning which few students possess. The same may be said of Mendelejeff's theory and many other important generalizations. That faulty expressions and awkwardly constructed sentences, in a work of this character, where clearness and terseness of expression are so essential to a proper and ready understanding of the subject, are a great drawback to its usefulness cannot be denied. In its present condition a full and clear didactic system of instruction would be an essential accompaniment for the student. It is a book unsuited for beginners, as it presupposes a degree of mental training in the same line of thought which the study of text-books like Prof. Barker's "Chemistry for Students" or the "Einleitung in die Moderne Chemie" of Hofmann, of which an excellent translation exists, would develop. A number of mis-spelled words and grammatical errors occur throughout the work which a careful proof-reading should have eliminated. The book contains so much that is valuable and its arrangement is so admirable that it is a cause for regret and disappointment that we could not have had a clearer translation and one of greater literary merit from the English stand-point. E. C. K.

CHEMISTRY: General, Medical, and Pharmaceutical, including the Chemistry of the U. S. Pharmacopœia. A Manual on the General Principles of the Science, and their Applications in Medicine and Pharmacy. By JOHN ATTFIELD, F.R.S. Tenth edition, specially revised by the author for America. Philadelphia: Henry C. Lea's Son & Co. 12mo., sheep; price, $3.00.

The fact that this text-book has reached a tenth edition is sufficient evidence of its practical value as a book for the student. The author's extensive experience as a teacher has made him familiar with the difficulties usually met with by the student of chemistry, and the work before us is remarkable for the conscientious care with which each new and important step is explained. He takes nothing for granted, but defines and explains with a clearness and fullness leaving nothing to be desired in these particulars.

The present edition shows decided improvements over former ones. A notable feature is that its formulæ wherever given are brought up to the status of the latest (1880) revision of the U. S. Pharmacopœia. In fact, the whole of the chemistry of that standard seems to have been gone over and clearly explained. In the case of the alkaloids, the methods for their preparation are clearly given in concise terms. The estimation of morphia in opium, of quinia in cinchona, and the separation of the different alkaloids of cinchona are valuable additions. Besides the U. S. Pharmacopœia method of determining the morphia in opium no less than four other equally valuable ones are given, viz.: Prollius', Petit's, Flückiger's and Mylius' methods. About ten pages are taken up with many and valuable methods for the separation of the alkaloids of cinchona. We regret that in this department the author does not keep up his happy style of explaining thoroughly every step of the process. For example, in treating of the U. S. P. method for the separation of morphia, the question would naturally arise in the mind of the student, How is morphia extracted by means of lime and water, the alkaloid morphia being insoluble in water? A word would have explained it, had the author stated that the alkaloid being separated from its native acid was taken up by the excess of lime in solution, morphia being soluble in alkaline solutions. These explanations thrown in wherever it is possible make such a book of much greater value to the student, for whom it is especially intended.

The analytical tables have been extended and the number of reactions increased; indeed, the latest developments of chemical principles and their applications in pharmacy have been well set forth. The book unquestionably excels in the point of explanation. At the beginning every step is taken apparently with the greatest caution to avoid misconception from want of thorough elucidation; this, with the addition of new illustrations, places the present edition far in advance of its predecessors. E. C. K.

Principles of Theoretical Chemistry, with Special Reference to the Constitution of Chemical Compounds. By Ira Remsen, Professor of Chemistry in the Johns Hopkins University. Second edition, thoroughly revised and enlarged. Pp. 242. Philadelphia: Henry C. Lea's Son & Co., 1883. Price, cloth, $1.75.

This little book is a comprehensive presentation of the best that is known upon the subject of theoretical chemistry. It is divided into two sections, the first being "a general discussion of atoms and molecules," and the second "a study of the constitution or structure of chemical compounds." The logical manner in which each new theory is presented and studied leaves nothing to be desired. The work throughout bears the stamp of mature and truthful reasoning, based upon a thorough familiarity with the subject. Careful distinction is made between fact, theory, and hypothesis, and the use of chemical symbols and formulas explained in a manner which enables the student to use them intelligently and with a knowledge of their full meaning. To all who have met with difficulty in acquiring a knowledge of the theoretical ground-work of the chemistry of to-day, this book will be of special aid and value.

The present edition is an improvement upon the former one, much new matter having been added and the whole book thoroughly revised. E. C. K.

Chemistry, Inorganic and Organic, with Experiments. By Charles Loudon Bloxam, Professor of Chemistry in King's College, London. From the Fifth and Revised English Edition; with 292 illustrations. Philadelphia: Henry C. Lea's Son & Co., 1883. Octavo; price, cloth, $3.75; leather, $4.75.

The "Chemistry" of Prof. Bloxam is a standard work and while giving to the student a fair knowledge of the subject in a general way, the applications of chemistry to the various useful arts form the most important feature of the work and the one in which it differs from most of the text-books on the subject. The work will recommend itself more as a book of reference, especially in the domain of chemical technology than as a text-book for students, owing to the vast accumulation of subject-matter which it contains. The Organic section is especially valuable as showing the application of chemistry to the processes of manufacture of various organic products and the industries based upon them. The introduction is taken up with definitions of matter and its divisions of molecule and atom and their forces, together with atomic and molecular weights, the names and symbols of the elements, etc. Three definitions of the atom and four of the molecule are given. It would perhaps have been less confusing and misleading to have given one comprehensive definition of each. If any criticism could be made upon the make-up of the work it would be the meagreness of this department. The *science* of chemistry consists not alone of a vast accumulation of facts but includes a systematic presentation of the phenomena of the ultimate particles of matter, together with their correlation and the laws which govern them. E. C. K.

Horses' Teeth. A Treatise on their Mode of Development, Anatomy, Microscopy, Pathology, and Dentistry, compared with the Teeth of many other Land and Marine Animals, both Living and Extinct, with a Vocabulary and Copious Extracts from the Works of Odontologists and Veterinarians. By William H. Clarke. Second edition, revised. New York: William R. Jenkins, 1884.

This is a volume of two hundred and ninety-three pages, neatly printed and bound, containing numerous illustrations which add much to its interest and value. The present edition has many extracts of an authoritative nature, so that in reading the book one obtains a correct knowledge, not only of the development and eruption of the teeth of the modern horse, but also of the abnormal systemic conditions which may arise from interrupted dentition; also, some interesting information regarding the genealogy or evolution of the horse from very different ancestral types.

The great interest which has been taken the past few years in tracing the development of this animal adds to the value of the book, inasmuch as it contains extracts from the researches of Profs. Cope, Marsh, and others. The twenty-eight diagrams with which the book closes enable the novice to study accurately the conditions or appearances of the teeth at ages varying from one year to twenty. C. N. P.

Surgical Applied Anatomy. By Frederick Treves, F.R.C.S. With sixty-one engravings. Philadelphia: H. C. Lea's Son & Co., 1883. Price, cloth, $2.00.

Mr. Treves has produced in this little book one of the most valuable of recent additions to that department of medical literature which aims at facilitating, for the benefit of the student and general practitioner, the study or remembrance of facts often learned by rote when their practical bearing is not realized and too often forgotten at the time when familiarity with them is vitally important.

The book is unreservedly a good one, and is only to be criticised unfavorably on account of incompleteness, due to the limits within which, as one of a series of manuals, it had to be compressed. We suppose that among the many important subjects, such as the ligature of arteries, the regional anatomy of hernia, etc., which were thus omitted, the teeth seemed to have no preëminent claim to consideration; but it is to be regretted that the relations of their nerve-supply with that of the viscera and the reflex phenomena often resulting from it, their influence upon the development of the maxillæ and their consequent effect in preventing or producing deformities, their relation to the gums and alveoli during dentition, with the serious results produced by undue pressure at that period, their relation to the antrum and to inflammation, effusions, or new growths of that cavity, and a few similar points could not at least have been alluded to. Eighteen pages are given to an instructive chapter on the "Mouth, Tongue, Palate, and Pharynx." The gums are very briefly described, and the blue line which occurs along their margins in chemical lead-poisoning is said to be due to a deposit of lead sulphide in "the gum tissues." We believe it has been shown that it is chiefly if not entirely due to a deposit in the *capillaries* of the gums. It is rightly described by Mr. Treves as due to decomposition of the lead-salts circulating in the blood, by the sulphureted hydrogen produced chiefly by decomposition of food débris, and, he might have added, of the fluids of the mouth, also, so that the prophylactic measure of keeping the teeth clean, though valuable, is not an absolutely certain preventive. The book is neatly and attractively gotten up and is well worth its price.

ELEMENTS OF SURGICAL PATHOLOGY. By AUGUSTUS J. PEPPER, F. R. C. S. With eighty-one engravings. Philadelphia; H. C. Lea's Son & Co., 1883. Price, cloth, $2.00.

In this little book, which is one of the same series as that of Mr. Treves, the author has condensed in a readable but elementary manner most of the modern views as to general pathology, including that of special regions. Here again no mention whatever is made of the teeth, though it might be thought that dental necrosis, alveolar abscess, etc., were as well entitled to a place in such a work as gonorrhea or swelled testicle. Two pages are assigned to harelip and cleft palate, but no mention is made of defects of articulation, arrested development of the maxillæ, etc., with their important influence upon mastication and digestion.

The book is, we suppose, as comprehensive as is possible within the limits of 500 duodecimo pages, and so far as it goes is correct, but viewed from a clinical stand-point is inferior to Mr. Treves's, both in the selection of subjects and the relative apportionment of space.

THE PATHOLOGY AND TREATMENT OF VENEREAL DISEASES. By FREEMAN J. BUMSTEAD, M.D., LL.D., and ROBERT W. TAYLOR, A.M., M.D. Fifth edition. With 139 wood-cuts and 13 chromolithographic figures. Philadelphia: Henry C. Lea's Son & Co., 1883. Price, cloth, $4.75; sheep, $5.75.

This valuable work has been so long and so favorably known to the profession, that this new and revised edition requires hardly more than a notice of its publication. Dr. Taylor has in many respects brought it up to the modern level, but seems to us to have notably failed in respect to the important subject of the influence of hereditary syphilis upon the teeth, which from a diagnostic point of view, if from no other, merits much more than the page, chiefly of quotation, which he cursorily bestows upon it. No allusion is made to the variations in the dental peculiarities in this disease, no mention of their etiology, no explanation of their close simulation by other abnormal conditions, no reference to their relation to atrophy or caries—nothing, in fact, to show that any special or thoughtful attention had been given to the subject. We notice the same sort of omission in other portions of the work, the revision of which seems to have been done unevenly; but in spite of these defects and of some unpleasant dogmatism on the part of Dr. Taylor, the book still retains the place which it has held for years as the best and most reliable treatise on venereal diseases in the language. The publisher's work has been done in a manner beyond criticism.

EPITOME OF SKIN DISEASES, with Formulæ for Students and Practitioners. By the late TILBURY FOX, M.D., F.R.C.P., and T. COLCOTT FOX, M.B., M.R.C.P. Third American edition, revised, and with additions by T. COLCOTT FOX, B.A. (Cantab.), M.B. (Lond.). Philadelphia: Henry C. Lea's Son & Co., 1883. Price, cloth, $1.25.

This is a most admirable epitome—compact and yet comprehensive, and so arranged as to afford easy reference to any special subject. The definition, description, and treatment of each of the very numerous forms of skin disease are concisely given, so that, as an assistant to the student in the study of dermatology, and as a manual for ready reference by the practitioner, the book is all that could be expected within its limits.

SEPULTURE: Its History, Methods, and Sanitary Requisites. By STEPHEN WICKES, A.M., M.D. Philadelphia: P. Blakiston, Son & Co., 1884. Price, $1.50.

The author first gives a concise and interesting historical survey of sepulture from the beginning of history. He then takes up the discussion of the malignancy of animal putrescence, and the pestilential effects of the emanations from tombs, vaults, and graveyards; of sewers and wells made foul by such emanations; of the ready escape of the gases of decomposition; of the sanitary requisites of cemeteries; and the necessity of protection to sources of water-supply. He argues that interment should be a subject of legislation, and that the dead should be so buried that the living may not suffer.

BURR'S INDEX TO MEDICAL SUBJECTS, adapted to the special use of Physicians and Surgeons, for the Annotation of Particular References to matters found in Text-books, Journals, etc.; and for the

Entry of Notes and Observations in Daily Practice—in short, for the Preservation of Memoranda for Ready Reference. Hartford, Conn.: Burr Index Co. Prices, $2.75 to $3.75, according to size.

This Index has been carefully and scientifically arranged, and is admirably adapted for readily registering any memoranda desired, and for easy reference to the same. All words entered are indexed by the first two letters. Thumb-holes cut in the edges of the leaves, and a projecting alphabet, printed in gold letters on morocco leather, enable one using it to open at any combination by the use of one hand. Such a book, in which records are so easily made and so readily found, if properly kept, will soon become more valuable to the owner than any other book in his library.

OBITUARY.

IN MEMORIAM.—Dr. T. L. BUCKINGHAM.

A MEMORIAL meeting, under the auspices of the dental societies of Philadelphia, in honor of the memory of Prof. T. L. Buckingham, was held in the hall of the Pennsylvania College of Dental Surgery, October 30, 1883. Dr. Daniel Neall was called to the chair, and Dr. Theodore F. Chupein appointed secretary. Resolutions were adopted expressive of high respect and affectionate regard for the deceased, and of sympathy with his family. Eloquent remarks were made by a number of the gentlemen present, in which was evinced a recognition of his genial character and sterling worth, of his liberal and tolerant spirit, of his services to the profession, and of the sorrow occasioned by his death.

DR. J. CARLOS GARDINER.

DR. J. CARLOS GARDINER died, at Madrid, Spain, on the 19th of November, 1883, of pneumonia. Dr. Gardiner was born at Havana, Cuba, in 1827, but has been for more than twenty years successfully practicing his profession of dentistry in Madrid.

DR. M. M. OLDHAM.

At a meeting of the dentists of Springfield, Ohio, held on Tuesday, October 30, 1883, action was taken in reference to the death of Dr. M. M. Oldham, of that city, which occurred at New Orleans, La., October 27, 1883. A committee consisting of Drs. C. R. Converse, W. H. Smith, and T. A. Lewis, reported resolutions, which were adopted, of respect to the memory of one whom they considered an honor to the profession, and it was ordered that they attend the funeral in a body.

PUBLISHER'S NOTICE.

THE DENTAL COSMOS FOR 1884.

We present with this issue the initial number of the Twenty-sixth Volume of the Dental Cosmos. As previously announced, we have added eight pages of reading-matter as a permanent increase to each number. This is almost equivalent to fourteen former numbers, and will make a volume of seven hundred and sixty-eight pages. Even with this addition—such is the quantity of varied and valuable matter for the publication of which we have already arranged—we shall be under the necessity of omitting everything except that which is most relevant, pertinent, and practical in the theory and practice of dentistry.

The increased size of the volume brings with it no increase in the price of the journal, which will remain as heretofore, $2.50 per annum, in advance.

We feel a legitimate pride in the character of the Dental Cosmos, and as well in the general recognition of its value, which has given it a circulation in every part of the civilized world. It is not necessary, in the light of its past history, that we should promise anything as to its future conduct. Our vouchers are the twenty-five volumes which have preceded.

Prompt renewals and subscriptions are requested. A blank order for this purpose will be found at the end of the reading pages. *Postage to the United States and Canada is included in the regular subscription price*, $2.50. *Subscribers in all other countries will remit the additional postage. The rate to Universal Postal Union countries is* 50 *cents; to Australia and New Zealand*, 96 *cents.*

The S. S. White Dental Manufacturing Co.

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Will some one instruct me as to the cause of the following case and the manner in which to remedy it? The patient is a professor in a classical school. Last July I made him a partial upper denture, which is a *perfect fit*, and there has been no trouble experienced in its use, saving that, immediately after going out into the open air, he becomes nauseated, and excessive gagging continues until the plate is removed, when the trouble ceases. Upon entering the house he again inserts the plate, and no unpleasantness follows until he goes out-doors again. The plate does not extend further back than to the second molar.—W. A. White, D.D.S.

To the Editor of the Dental Cosmos:

The esthetics of substitution has been alluded to by you in several editorial articles, and the necessity has been pointed out for the study of esthetic anatomy. The importance of the subject is recognized by the undersigned, and his ignorance of the law of correspondence, which teaches the relation of the teeth to temperament, etc., is a daily mortification to him. The subject may be said to have no literature—a lack which be sure is felt by hundreds beside the writer. Will not you or some other qualified for the work give us the basal principles which will enable us to recognize how to select teeth in size, shape, and color adopted to the physical characteristics of our patients?—W. B. J.

See editorial notice on this subject in this issue.—Ed. Dental Cosmos.

In reply to F. R. N., in the November number of the Dental Cosmos, ("Hints and Queries"), regarding lower dentures, I would suggest a method in which I have been uniformly successful. Take the impression in plaster; coat with shellac, oil, and fill. Take the bite and adjust the cast to an articulator. Previous to grinding up the teeth procure a piece of tin such as is generally used for air-chambers, and roll to about the thickness of No. 17 standard gauge. Then cut from this a strip one-sixteenth of an inch in width, file off the edges of one side so as to form a half round. Press this around the cast, flat side down, in the center of the alveolar ridge, so as to have it in the center of the plate, and extending to within one-fourth of an inch of the condyles on either side, and fasten with pin points the same as an air-chamber for upper denture. Then obtain a perfect articulation; invest as usual, remove the wax, and pack with weighted rubber until there is nearly enough for the plate. Then cut a piece of the cloth that comes with the rubber, large enough to cover the cast, and lay over it so as to separate from the rubber just packed, and bring them together in warm water. Open, remove the cloth, and lay in its place two thicknesses of soft, or palate rubber; bring together again in warm water, and vulcanize.—E. H. H.

In reply to the question of F. R. N. in the Dental Cosmos for November, 1883, page 607, I can suggest two ways that he might try for overcoming his difficulty. The first, which I think is the better and more likely to be successful, is to make a groove about one-sixteenth of an inch deep, just above the ridge, extending all along to within one-eighth of an inch of each extremity. The second way is in the use of spiral springs—a method too often used in England, and one of the disadvantages of which is that the springs frequently break, and have to be renewed from time to time.—ALEXIS DE NÉGRI, *London*, *England.*

If F. R. N., who in the DENTAL COSMOS for November, 1883, asks for suggestions as to securing a plate after absorption of the alveolar processes in the lower jaw, will refer to page 622 of Vol. xxii. (November, 1880), I think he will learn how to treat the case described. I have tried it repeatedly, and have found it to work admirably. I feel myself under great obligation to Dr. Gordon for suggesting this plan. I hope F. R. N. will try it and let us know the result.—W. H. C.

TO THE EDITOR OF THE DENTAL COSMOS:

A short article entitled "A Radical, Simple, and Successful Treatment of Teeth Associated with Putrid Pulps, without a Fistulous Opening," in the DENTAL COSMOS for November, page 612, in the department of "Hints and Queries," by Dr. Geo. A. Mills, needs some comment, in order that those who read hastily or thoughtlessly should not jump to the conclusion that at last they can cry "Eureka!" The doctor says that the method which he details is "a demonstrated and successful practice with these cases." He does not state how long he has practiced this method (which is not new, except in the use of red cedar), nor what number of cases has been successful. Neither does he state how it happens that oxygen and hydrogen compose the air we breathe (we thought that H_2O represented a molecule of water), nor how long the carbolate of albumen, even though impinged by "red cedar dipped in carbolic acid, full strength," maintains its integrity when the dentine of a tooth may be saturated by "sulphuret of hydrogen." Does the author suppose that carbolic acid when brought in contact with albumen, as found in a root-canal in which the pulp has putresced, is going to disinfect the canal and the dentine? If so, he displays a very faulty knowledge of chemistry.

How much longer are we to be told that delicate spring drills, reamers, canal straighteners, and other absurdly devised instruments (very useful but to be used rarely) of the above class may "with care and delicacy be used to the very apex?" It is about time that good judgment and scientific knowledge were displayed by writers who desire to instruct the uninitiated in delicate manipulations and a correct use of antiseptics and germicides. The teacher should himself have a definite knowledge of the subject which he is teaching. When it comes to be more generally recognized by dentists, old and young, that putrescing pulps are to be removed antiseptically (*but not under carbolic acid*), and that escharotics or medicaments which coagulate albumen are to be *tabooed* entirely, then the coming dentist will not make the mistakes which many of us have been in the habit of making. The gases of decomposition should be antagonized by agents which have such an affinity for one of the elements composing them, that new compounds will be formed not gaseous in their nature (permanganate of potassium, bichloride of mercury, [1-30,000], chloride of alumina, peroxide of hydrogen, solution of calcium, chloride sanitas, eugenol, etc.), and the root-canals are not to be filled (imperfectly often where "red cedar dipped in carbolic acid full strength," or any other wooden spiculæ are used) in the manner described on page 612 of the November DENTAL COSMOS. If such treatment as I have outlined be followed then there will be fewer cases of pericementitis and alveolar abscess to treat, which will be a great boon to the patient.

I am not one of those who believe that "a radical, simple, and successful treatment of teeth associated with putrid pulps, without a fistulous opening" "is to be the treatment of the coming dentist." I am too skeptical. I have tried it (not with "red cedar, etc."), others have tried it with modifications, and it is not only likely to give the practitioner anxiety but the patient likewise. The "red cedar" will have to be dug (up) from the root, and very quickly, too. Teeth containing putrid pulps are not met with every day, entirely free from pain and tenderness, on pressure being applied to them. They do not all have simple straight roots,—the majority have crooked roots; and many of them have tortuous canals, frequently with a diameter not as large as a hair. Numbers of teeth have cavities difficult of access; and by the time an entrance is effected to the canals the tooth may be very tender, even though you "associate with the instrument used carbolic acid full strength." The greater number of such teeth come to the dentist for treatment when an alveolar abscess is in process of formation. Would it be wise to practice "a radical, simple, etc." treatment there? I think not. When entrance is made into a pulp-chamber containing a putrid mass it generally emits a foul odor (H_2S). The dentine is permeated throughout by the gas. Now, if in the innocence of your ignorance you should fill the canal with "red cedar, etc.," without first disinfecting it, you will have a fine opportunity (in a majority of cases) for studying the process of inflammation to suppuration. A thin glazing of the root-canal with carbolate of albumen will not for any lengthened period confine H_2S. I think it could be detected in less than one minute after drying the canal. It must have exit. If it cannot escape through the canal externally, it seeks first the apical foramen (not generally closed by wooden root fillings) for exit. The pericementum is irritated, then inflamed; it is distended from its attachment to the cementum by the gas, the tooth is projected from its socket, being sensibly elongated when the mouth is closed, and if allowed to run its course an alveolar abscess with fistulous opening is the result. Should the foramen be closed *by accident* in filling the canal with "red cedar, etc.," the H_2S will escape even though the tooth be not tender the first days or weeks after filling. When it does escape in sufficient quantity through the cementum it will cause the same train of symptoms as above described.

Our author's generalizations about the *why* of the treatment which he thinks will be adopted by the coming dentist, and the discourse about atmospheric air, bacteria, stale eggs, etc., need not be discussed.—A. W. Harlan.

Treatment of Alveolar Abscess with Fistula from Putrescent Pulp.—I had practiced as taught the stereotyped, familiar method of treating alveolar abscess, by opening the canal at the apical foramen and forcing the chosen medicament through until it made its appearance upon the gum. Having become tired of this tedious and uncertain procedure, it was my good fortune to receive instruction as to a method which I have since followed with great satisfaction.

When a tooth with abscess comes under my charge, if I find that it is caused by a putrescent pulp and has a fistulous opening, I cleanse the canals as thoroughly as I can; I say as thoroughly as I can, because some practitioners claim that they always cleanse a root-canal to the apex. I think they are sometimes mistaken, for there are roots that it seems to me impossible to cleanse to the apex. After having cleansed the canal or canals as thoroughly as possible, they are wiped out with iodoform paste, experience with which for the past two or three years gives me increasing confidence in it as an antiseptic. The paste is made as follows:

℞.—Iodoform, gr. xxx.
Tannin, gr. i to iii.
Glycerin, ʒ ½.
Oil of cloves, part of a drop.

Pulverize the iodoform thoroughly, and mix in a mortar. The odor of the iodoform is so modified by the tannin after standing for thirty or sixty days that it is not at all disagreeable; but if used when first mixed the odor will remain in the office for some time. I have also used the following, which acts nicely, but it also should be allowed to stand for thirty days before using, otherwise the odor will be objectionable:

℞.—Iodoform, ʒi.
Balsam Peru, ʒi.
Glycerin, gtt. xl.

Mix in a mortar the same as the preceding. The canal is then filled with the inspissated paste, worked in as thoroughly and as far as possible, so as to fill the whole canal. A guard-ball of cotton is placed in the bulbous portion and the cavity tightly filled with a temporary stopping. This remains until the tooth is in a healthy condition and the fistula healed, when a part of the stopping is removed, but none of the paste in the canals. If the permanent filling is to be of amalgam, it may be placed in upon the temporary stopping, filling the bulbous portion; but if gold is to be used, the tooth should be lined with one of the plastic cements that will give a firm foundation. The formula for the inspissated paste is:

℞.—Acetate of morphia,
Sulphite of lime, aa gr. x.
Glycerin, q. s.—M.

With this treatment the tooth very seldom becomes sore, or, if it does, the soreness soon passes away. The cause of the abscess and fistula having been removed, the parts readily heal.—S. Eldred Gilbert, D.D.S.

Fracture of Blocks in Vulcanizing.—I have noticed inquiries from time to time in reference to the fracture of blocks *in* vulcanizing. The fact is that the blocks break *after*, and not during, the vulcanizing process. Two facts should be distinctly borne in mind, viz., that while *all* vulcanized hard rubber contracts in cooling, the purer varieties—those containing the least proportion of foreign admixture—have the most contractile power; secondly, that the higher the process of vulcanization is carried, the greater is the shrinkage in cooling. The advantages of a pure rubber are compactness (and therefore susceptibility to high polish), strength and elasticity, but with these advantages must be accepted a powerful contractility. The advantage of a rubber heavily loaded with foreign substances is that it has comparatively little shrinkage, but this is offset by porosity and brittleness. One must choose between the two varieties, and accept the disqualifications of one or the other. "We cannot have the penny and the cake, too." The writer has been told by the foreman of a company engaged in vulcanizing rubber that in covering iron tubing sixteen inches in diameter with rubber a half-inch thick, he has had the rubber to burst with a report like a cannon, and open three-eighths of an inch, and that to avoid a repetition of such experiences he has had to resort to the use of a less pure rubber, to a lower vulcanization, and to a slower cooling. If such be the contractile force of the rubber in cooling, is it any wonder, with a block having a long, thin arm, and curved both in its length and breadth, that fracture should occur by the shrinkage of the rubber, especially when the rubber is allowed to overlap the gum.

The method of jointing the sections has also much to do with the liability of fracture, and as before said, a sudden change of temperature allowing the rubber to contract too vigorously.

Permit me, in closing, to acknowledge valuable suggestions in the department of "Hints and Queries," DENTAL COSMOS for January and May, 1883.—P. R. W.

A COMBINATION TOOTH-CROWN.—During the last few years there has been much said and written about artificial tooth-crowns, and many different and valuable processes have been described for mounting such crowns on the roots of the natural teeth. The crown I am about to describe may be adapted to any root, but I claim for it special advantages in its application to bicuspids. I will omit the mention of modes other than those which are in direct relation to my method.

I have now in view the the Morrison, Richmond, and the Bonwill crowns, which I modify and, as I think, improve. The first-mentioned crown, made entirely of gold is too conspicuous in appearance for bicuspids; and if made with a porcelain front, gold band, and gold backing, is complicated in construction, and more difficult to adjust in relation to the antagonizing teeth than is mine. The Bonwill crown has one great objection, which is the lack of durability. I have put on Bonwill crowns that wear well, but in quite a number of instances the pins were broken off at the joint, and the roots had to be recrowned. I have therefore made a combination of those two crowns, with the addition of an improvement in construction and method of mounting, that enables me to make a successful operation, thus uniting simplicity, beauty, and strength.

FIG. 1.

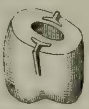
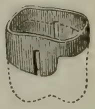


FIG. 2.



The crown, Figure 1, has two vertical projecting platinum tongues baked into the body of the crown, and extending for about half a crown-length from its neck along each of its lateral surfaces.

The band, or ferrule is shaped as shown in Figure 2; having duplicate slots to correspond with the tongues in the crown.

The slots should be carefully cut low enough to avoid contact with the cervical edges of the tongues, and the crown should be ground shorter than needed.

Then place the band with the crown on the root, and let the patient close the mouth, when it will be seen that the crown has found its own articulation with its antagonist. In this position cover the crown and band with plaster of Paris, remove all together and solder the tongues to the band, filling with foil or cement any space that may be found between the band and the crown.

The root or roots having been previously filled, and the pin inserted, put the crown and band in place and through the coronal opening pack amalgam firmly around the pin, and the operation, if done well, will be a permanent one.—GEORGE A. CHRISTMANN, D.D.S., *Chicago.*

MOUTH-BREATHING AS A CAUSE OF TOOTHACHE.—Miss S., one of my patients, aged about nineteen, called to see me a few days ago in reference to an intermittent pain in the superior central incisors. These had been filled some years before, and had given general satisfaction, except during cold weather, when the pain regularly made its appearance. It was not more intense now than formerly; but she was tired of it, and had resolved to have the trouble remedied, if possible. The sensation, which was not of an acute nature, but rather neuralgic in character, was confined to the superior central incisors and the alveoli envelop-ing their roots. Upon examination I found these teeth all well filled and in a good state of preservation, some of the fillings having been in five years, and never having given any trouble except in cold weather. No inflammatory action was noticeable either in or around the teeth; they were not tender, nor painful on percussion, and examination with the mirror failed to reveal discoloration of the tooth-substance such as would arise from spontaneous death of the pulp. Besides, it was known that the pulps, far from having been dead when the teeth were filled, were not even exposed. They were therefore evidently both alive and healthy at present. The fillings were also in beautiful condition, and for the moment the teeth were perfectly comfortable. I was thus placed in an awkward quandary, by the necessity of doing something to relieve the pain, in the absence of any morbid symptoms to put me on the track of the cause. I did not doubt that temporary relief might be attained by removing the gold fillings and replacing them with oxyphosphate; but this would only have led me further into the difficulty, since as soon as the teeth became comfortable I was quite sure that my patient would want them filled with gold again. Neither could I conscientiously remove fillings so satisfactory from every point of view, merely to replace them with the same metal.

While conversing with a view to elicit some scrap of information that would serve as a clue, I observed that the patient habitually kept her mouth open. The dental specialist, no less than any other pupil of Æsculapius, has to keep up an appearance of omniscience under all circumstances; hence, without betraying how much I was at fault as to the cause, I plumply asserted that the whole trouble arose from mouth-breathing, and the consequent effects of the cold air impinging on the teeth, instead of passing through its natural channel—the nostrils. I further inquired whether she knew of the existence of this habit, and of its continuance during sleep. She answered that she was quite aware of the practice, and had been told that she slept with her mouth open. My advice was to correct the habit as far as possible during daytime, and on retiring to use some means to keep the mouth closed; or, if that was too inconvenient, to tie a kerchief over it, so as to protect the teeth from the exposure. These simple directions, faithfully followed, appear to have effected a radical cure, for I have heard nothing of the pain since.

Here is a case where an unobservant practitioner would probably have removed the fillings, putting the patient to unnecessary inconvenience and expense, and without any real benefit. It has recently been demonstrated by official researches that mouth-breathing is a prevalent cause of deafness among school-children; the present case shows the importance of taking it into account in dental practice.—A. H. Best, M.D., L.D.S.R.C.S.I., *Savannah*, *Ga.*

Deodorizing Iodoform.—I have been very much interested in the paper on Iodoform," in the October number of the Dental Cosmos, and as the "persistent odor" seems to be the principal objection to its use, I offer my method of disguising it. I use iodoform in a 10 per cent. solution of carbolic acid, to which I add two grains of cumarina. The unpleasant odor is entirely overcome. Cumarina is extracted from the tonka bean, and so far as known is innoxious and without medicinal properties. A very good paste without odor may be made by mixing 1 grain of cumarina with a teaspoonful of collodion and adding or grinding up with it iodoform according to the strength desired.—J. G. Van Marter, A.B., D.D.S., *Rome*, *Italy*.

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ORIGINAL COMMUNICATIONS.

EMBRYOLOGY: WITH SPECIAL REFERENCE TO THE DEVELOPMENT OF THE TEETH AND CONTIGUOUS PARTS.

BY J. L. WILLIAMS, NEW HAVEN, CONN.

[Read before the New England Dental Society, at Providence, R. I., Oct. 4, 1883.]

MR. PRESIDENT AND GENTLEMEN OF THE NEW ENGLAND DENTAL SOCIETY:

My position, as I stand before you to-night, is not an enviable one. That I should follow, in the same day,* with a paper which must necessarily go over at least a portion of the field traversed by one whose life is already laden with the rich fruitage of years, whose reputation is not only national but world-wide, must seem like presumption.

To Prof. Garretson, the polished gentleman, the professional man who probably stands without a rival in his specialty, I accord my most profound respect, with the consciousness that words of mine can hardly add to the high esteem in which he is justly held by his admiring professional brethren. But we must not allow ourselves to be blinded by rare personal accomplishments, and my love for truth so far outranks my deference for men, that I say at the outset, frankly, but respectfully, that it has never before been my lot in any dental convention to listen to such a presentation of misapprehensions and pseudo-philosophic vagaries as was made by the gentleman who addressed you this afternoon upon the subject of "Dentition." And this is all the more to be regretted because the position which the gentleman occupies and the manner of his expression seem to put a premium upon a lack of knowledge concerning this very important subject. But little knowledge of the early stages in the development of the teeth can be gained except by careful, patient study of actual sections of fetal jaws under the microscope. I hope, by the aid of photographs which will be projected on the screen to-night, to present a more accurate and intelligible conception of the subject than that to which we listened earlier in the day.

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* Referring to Prof. Garretson's address on "Dentition."

I shall make no attempt to present a complete résumé either of general embryology or of the development of the teeth.

I desire first to call attention to certain important principles which underlie the development of all organisms. What special reference I shall make to the development of the teeth will be for the purpose of correcting the erroneous views presented by most of the standard text-books upon this subject, and to give the results of my recent investigations by the aid of high magnifying powers.

I have also been prompted to present this paper as an attempt to express my appreciation of the efforts of one whose life has been devoted to the work of elevating our profession by inculcating the importance of a knowledge of general principles in all study and investigation. I refer to our highly-esteemed and venerable teacher, Dr. W. H. Atkinson. It has been said that it is, in some respects, a misfortune for a man to be born before his time. No man is *ever* born before his time; but the world has never been without a few who, as Tyndall would say, by an intellectual necessity are constantly crossing the boundary of experimental evidence, and discerning principles, laws, and relationships of matter which are beyond the ken of ordinary men. It is in the very nature of things that these men should be misunderstood and misinterpreted. The reward for their labors must come largely from the delight growing out of a desire to investigate and acquire *truth* for its own sake.

The time allowed for such a paper as this will prevent more than a very condensed arrangement of the subject-matter. I have therefore to ask your undivided attention.

The term embryology, as interpreted by modern investigators, is employed to cover the anatomy and physiology of the organism during the whole period embraced between the time of the impregnation of the ovum and the complete development which it attains in the adult.

From a biological stand-point, the life-history of every being is completed with the termination of a cycle. In many of the first or simpler forms of life, this cycle is concluded in a few hours, while years are required for its completion in the higher and more complex organisms.

Ontogeny, by which is meant the life-history of any individual organism, may, in a general way, be said to be a summing up or a recapitulation of phylogeny, or the history of the development of all the lower forms of life which have preceded it. Thus, if we examine a human embryo at any period in the early stages of its development, we shall find, quite as much in its internal constitution as in its external appearance, a close resemblance to some completely developed lower form of life. This fact is one of very great importance in the study of embryology; for the obscurities and uncertainties necessarily surrounding any attempt to elucidate those higher laws which find expression in the more complex organisms are not encountered in our studies of the lower forms of life, in which these same laws are expressed, but in simpler terms. The significance of this point will be more clearly seen as we proceed with our investigations.

As it is not proposed in this paper to deal with embryology in a general way only so far as it has relation to the evolution of the teeth and associate parts, I shall present only such a brief summary of the early stages of the development of the embryo as I deem necessary to give a clear conception of the more important phases which precede that stage in which those changes are first observed which result in the development of the teeth.

The complete human organism, in common with every animal body, is composed of a vast number of unitary elements called cells, (more properly corpuscles or plastids) all of which originate from a single form called the *cytula* or parent-cell. This parent-cell is the result of the union of the *spermule* or paternal-cell with the *ovule* or maternal cell. The union of these two elements is commonly spoken of as the impregnation or fecundation of the ovum. The ovum or maternal cell is a little globular mass of protoplasm surrounded by a thick membrane called the *zona pellucida* or *chorion*. On the surface of the protoplasmic portion of the cell lies the *germ-vesicle* or nucleus, and within this the *germ spot* or nucleolus.

The latest and most satisfactory explanation of the phenomena of impregnation is the result of a series of researches conducted by Fol. According to this authority, the spermatic cells of the male originate from cells indistinguishable from the primitive ova of the female. Both cells are nucleated, and the most important feature of impregnation appears to be the fusion of the nucleus of the male and female elements. When the living matter of these two elements is brought into contact there results a series of changes which we will now attempt to follow and describe.

The nuclei of the male and female cells unite to form a new nucleus, while the protoplasmic cell-substance unites to form a new cell.

This union is something more than a mere mechanical mingling of parts; it is the result of a physico-chemical change, in which there is an intense molecular action and interaction and which results in the new form—the parent-cell.

The immediate result of the union of the male and female pronucleus, or, as it is more commonly expressed, the fecundation of the ovum, is its segmentation, or division into two parts. These divide into two each, producing four, the four into eight, the eight into sixteen and so on until a membrane of cells has been formed around a central cavity, which is known as the segmentation cavity, while the sphere is called a blastosphere.

FIG. 1.*

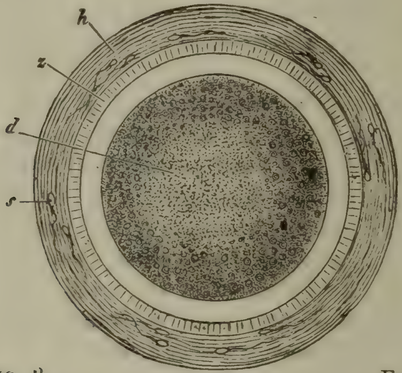

FIG. 2.

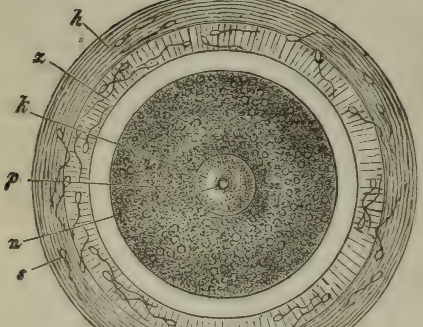

FIG. 3.

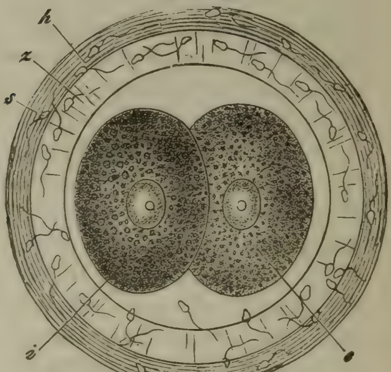

FIG. 1. Monerula of a Mammal (Rabbit). The fertilized egg-cell after loss of the germ-vesicle is a simple ball of protoplasm (*d*). The outer envelope of this is formed by the modified *zona pellucida* (*z*) and by a mucous layer (*h*), which is deposited on the outside of the *zona*. A few sperm-cells are still visible in this mucous layer (*s*).

FIG. 2. Parent-cell, or cytula, of a Mammal (Rabbit); *k*, parent-kernel or nucleus; *n*, nucleolus; *p*, protoplasm of the parent-cell; *z*, modified *zona pellucida; h*, external albuminous envelope; *s*, sperm-cells.

FIG. 3. Commencement of cleavage in the mammalian egg (Rabbit).

The parent-cell has separated into two differing cells, the brighter mother-cell of the skin layer (*e*) and the darker mother-cell of the intestinal layer (*i*); *z*, *zona pellucida; h*, external albuminous envelope *s*, dead sperm-cells.

In the ova of mammals the differentiation is perceptible from the first division of the ovum, one-half of which is slightly larger and

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[*] Figs. 1, 2, 3, 4, 5, 6, are from Haeckel's "Evolution of Man."

more transparent than the other. The larger of these two spheres into which the primitive cell or ovum divides is destined to form the germinal layer known as the epiblast, and is therefore called the epiblastic sphere, while the smaller is to develop into the layer to which the name hypoblast is given, and this is accordingly called the hypoblastic sphere. As these spheres continue to divide, the hypoblastic cells take up a position in the center, while the epiblastic cells arrange themselves in a layer forming the outside or circumference.

Thus, in a few hours after impregnation, there is foreshadowed the future history of the development of the embryo. The external or epiblastic layer is destined to develop into the external epithelium with its wonderful transformations into hair, nails, teeth, and nerves of general and special sense; while the internal or hypoblastic cells develop into the internal epithelium, with its equally wonderful transformations into special digestive organs. As we proceed I shall point out more fully the significance of these layers. After the formation of these two layers it is seen that a cavity has begun to be formed between the lower side of the hypoblastic cells and those constituting the epiblastic layer. This cavity,—the blastodermic vesicle,—as well as the entire ovum, rapidly increases in size. The hypoblastic cells spread out over the under side of the epiblastic membrane and at the same time an increase in thickness is observed at the point of attachment, producing the appearance of an opaque, circular spot on the blastoderm, which is the commencement of the embryonic area. A few days later a line may be observed running across this area. This line is called the primitive streak. If now a transverse section be cut from the embryonic area it will be seen that a third layer of cells has commenced to form between the two layers I have already mentioned. This third layer is called the mesoblastic layer.

FIG. 4.

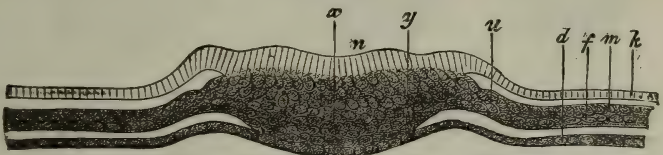


FIG. 4. Transverse section through the germ-disk of a Chick (a few hours after the beginning of incubation); *h*, skin-sensory layer; *m*, skin-fibrous layer; *f*, intestinal-fibrous layer (the two latter are united into the middle layer or mesoderm); *d*, intestinal-glandular layer. All the four secondary germ-layers have coalesced in the middle and form the thick axis-band (*x*, *y*); *n*, first trace of the primitive groove; *u*, region of the future primitive kidney rudiment. (After Waldeyer).

Immediately following the formation of the primitive streak two folds, caused by a rapid proliferation of corpuscles at these points, are seen to rise up in front of and running parallel with the primitive streak. These are the so-called medullary folds and the depression between them is called the medullary groove. The groove and the folds constitute the first definite trace of the embryo.

The two medullary folds diverge behind and inclose the front end of the primitive streak. As the embryo elongates a constriction appears in the lateral mesoblastic plates, which marks the vertebral zone, in which appear indications of somites, the foremost of which marks the junction of the cephalic region and the trunk. The increase in the length of the trunk is by the addition of fresh somites from behind.

FIG. 5.

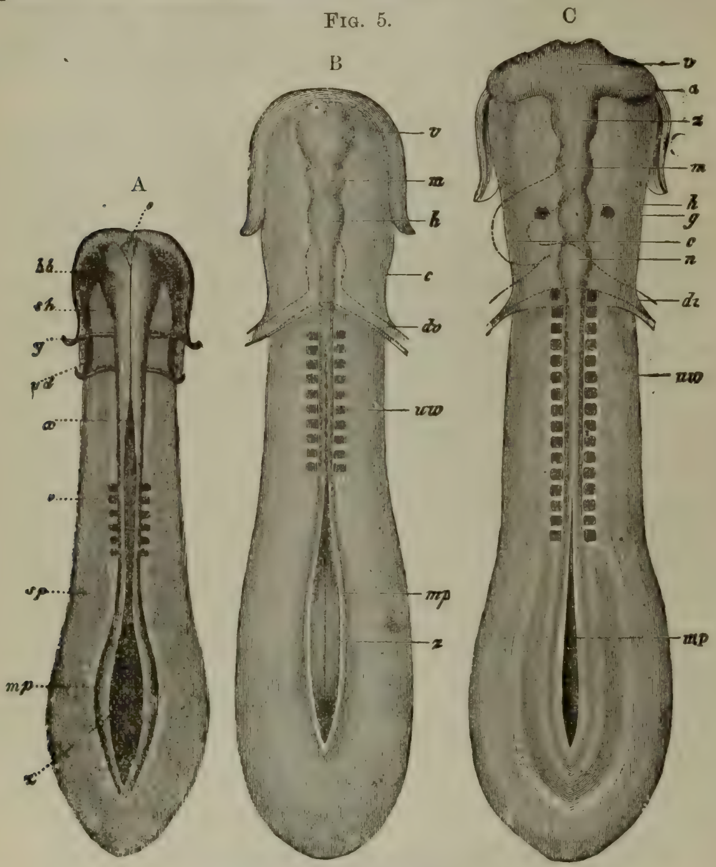


FIG. 5. Lyre-shaped germ-shield of a Chick, in three consecutive stages of development, seen from the dorsal surface (about twenty times the natural size); A, with six pairs of primitive vertebræ. Brain is a simple bladder (*hb*).[*] The spinal furrow is open behind *x*; at the posterior end it is very wide open at *z*; *mp*, medullary plates; *sp*, side-plates; *y*, limit between throat-cavity (*sh*) and head-intestine (*vd*). B, with ten pairs of primitive vertebræ. The brain has parted into three bladders; *v*, fore-brain; *m*, mid-brain; *h*, hind-brain; *c*, heart; *dv*, yelk-veins. The medullary furrow continues wide open at the posterior end (*z*); *mp*, medullary plates. C, with sixteen pairs of primitive vertebrae. The brain has parted into five bladders: *v*, fore-brain; *z*, twixt-brain; *m*, mid-brain; *h*, hind-brain; *n*, after-brain; *a*, eye-bladders; *g*, ear vesicles; *c*, heart; *dv*, yelk-veins; *mp*, medullary plates; *uw*, primitive vertebræ.

The anterior portion of the medullary plate increases in size and forms a spatula-shaped cephalic enlargement. At the time when about eight somites appear and the trunk considerably exceeds the

FIG. 6.

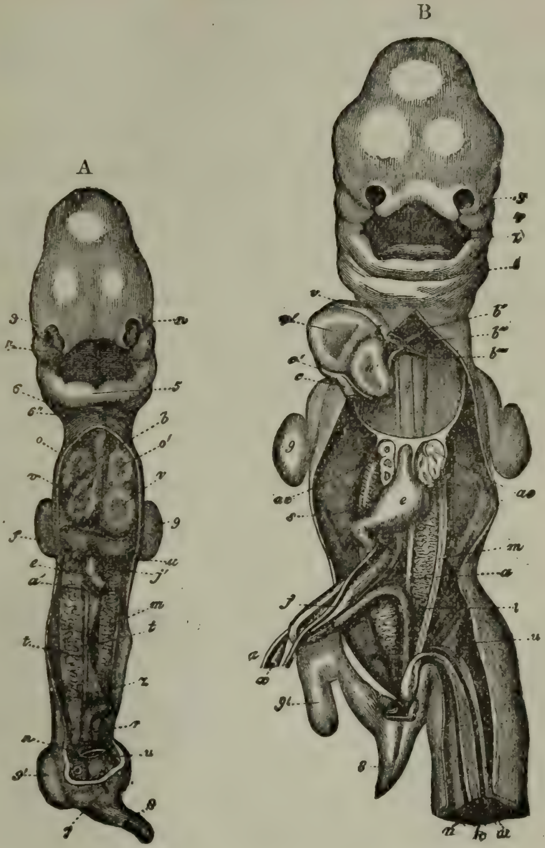


FIG. 6. A, Human embryo of four weeks old, opened on the ventral side. The walls of the chest and abdomen have been cut away, so that the contents of the chest and ventral cavities are visible. All the appendages (amnion, allantois, and yelk-sac) have been removed, and also the middle portion of the intestine; *n*, eye; 3, nose; 4, upper jaw; 5, lower jaw; 6, the second gill-arch and 6″ the third; *o*,*v*, heart; (*o*, right, *o*′, left auricle; *v*, right, *v*′, left ventricle); *b*, origin of the aorta; *f*, liver (*u*, navel-vein); *e*, intestine (with the yelk-artery cut away at *a*′) *j*′, yelk-vein; *m*, primitive kidney; *t*, rudiments of the sexual glands; *r*, terminal intestine (with mesentery *z* cut away); *n*, navel-artery; *u*, navel-vein; 7, anus; 8, tail; 9, front limb; 9′, hind limb. (After Coste).

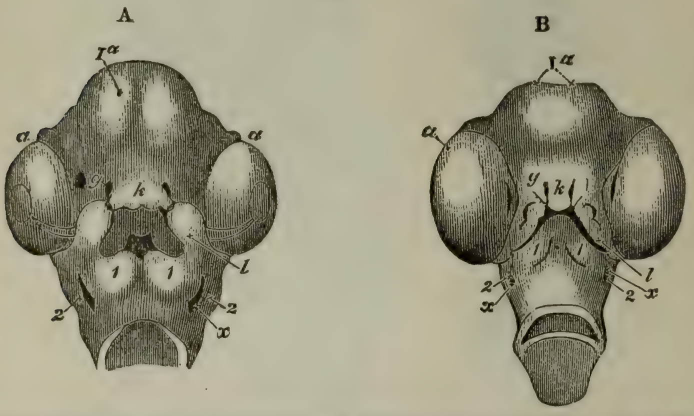
B, human embryo of five weeks old, opened on the ventral side as in A. The chest and ventral walls, with the liver, have been removed; 3, outer nasal process; 4, upper jaw; 5, lower jaw; *z*, tongue; *v*, right, *v*′, left ventricle of heart; *o*′, left auricle; *b*, origin of the aorta; *b*′, *b*″, *b*‴, first, second, third arterial arches; *c*, *c*′, *c*″, hollow veins (*venæ cavæ*); *æ*, lungs (*y*, arteries of lungs); *e*, stomach; *m*, primitive kidneys; (*j*, left yelk-veins; *s*, *venæ portæ*; *a*, right yelk-artery; *n*, navel-artery; *u*, navel-vein); *x*, yelk-duct; *i*, large intestine; 8, tail; 9, front limb; 9′, hind limb. (After Coste).

head in length, there appear the first distinct traces of the folding off of the head end of the embryo.

The cranial flexure now presents the most marked and rapidly developing portion of the embryo. Under the fore-brain there appear epiblastic involutions which develop into the so-called cervical fissures. Several of these fissures or clefts have only a temporary existence and disappear by the adhesion of their adjacent edges. Between the fissures there are bands, ridges, or arches. The upper of these arches are intimately concerned in the formation of the mouth.

The first visceral fold or arch divides on either side into two processes or buildings which grow rapidly forward, the lower pair uniting at the median line to form the inferior maxilla. This union occurs at the close of the first month of pregnancy. The two upper processes, from which the superior maxilla is formed, grow forward, but as they approach each other a third pair of processes is seen to grow downwards from the forehead or frontal apophysis. These processes develop into the so-called intermaxillary bones. That peculiar malformation known as "cleft palate" and "hare-lip" is caused by an arrest in the development of the intermaxillary bones. In the orderly development of these parts the superior maxillary processes grow forward and unite with them on either side. The

FIG. 7.



HEAD OF A CHICK FROM BELOW ON THE SIXTH AND SEVENTH DAYS OF INCUBATION.—(From Huxley).

Ia, cerebral vesicles; *a*, eye, in which the remains of the choroid slit can still be seen in A; *g*, nasal pits; *k*, fronto-nasal process; *l*, superior maxillary process; 1, inferior maxillary process, or first visceral arch; 2, second visceral arch; *x*, first visceral cleft.

In A, the cavity of the mouth is seen inclosed by the fronto-nasal process, the superior maxillary processes, and the first pair of visceral arches. At the back of it is seen the opening leading into the throat. The nasal grooves leading from the nasal pits to the mouth are already closed over.

In B, the external opening of the mouth has become much constricted, but it is still inclosed by the fronto-nasal process and superior maxillary processes above, and by the inferior maxillary processes first pair of visceral arches) below.

The superior maxillary processes have united with the fronto-nasal process, along nearly the whole length of the latter.

primary impulses which result in the development of these processes arise in the mesoblastic layer, while the epiblastic layer clothes them externally and folds inwards to form the lining of the mouth-cavity.

Before proceeding further in our study of the progressive development of these parts, I wish to examine somewhat more at length the anatomical and physiological relation and functions of these layers of which I have spoken; for the entire body, with all its complexity of related parts, is evolved by progressive development from these three simple germinal layers.

(To be continued.)

ALVEOLAR ABSCESS OPENING INTO THE ANTRUM AND NASAL CAVITY SIMULATING CHRONIC NASAL CATARRH.

BY JOHN S. MARSHALL, M.D.

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A CHRONIC, highly offensive discharge from the nose is generally considered as indicative of ozena. The term ozena means simply, however, "a foul odor," and may be due to various abnormal conditions affecting the nasal passages and accessory cavities. Among the most common causes are syphilis, struma, lupus, ulceration, caries or necrosis of the bones or cartilages, inflammation of the mucous membrane of the frontal or maxillary sinuses, or alveolar abscess opening into the antrum of Highmore, or into the nasal cavity direct. The origin of certain forms of chronic nasal catarrh with fetid muco-purulent discharge is by no means always easy of diagnosis, and among the most difficult is that form of the affection dependent upon alveolar abscess opening into the maxillary sinus. Inspection of the accessory cavities with our present facilities is impossible. We have therefore to depend upon external signs from which to form a diagnosis.

The relation of the superior incisors to the nasal fossa, and of the bicuspids and molars to the antrum of Highmore are such, that abscesses forming at the apex of their roots, from whatever cause (devitalized and putrescent pulps being the most common), may discharge into these cavities and set up a train of morbid conditions ranging from a slight nasal discharge to the most offensive ozena. It is not at all uncommon to find the roots of the superior molars penetrating the maxillary sinus, sometimes to a considerable extent, the covering lamina of bone being extremely thin,—much thinner than the alveolar plates at the apex of the roots,—while in other cases the bony covering is entirely absent. The superior incisors are also so situated in other cases, though much less frequently, that the intervening bony plate, especially over the apex of the central incisors, is no thicker than the external plate of the alveolus, and consequently would offer less resistance to the suppurative process than that portion of the alveolar border covered by the dense fibrous structure of the gums.

The most common natural evacuation of an alveolar abscess is through the external plate of the alveolus and investing gum-tissue. Occasionally it will take a direction through the internal plate of the alveolus, and point upon the palatal or lingual aspect of the alveolar ridge, or follow the pericementum between the alveolus and root, discharging at the margin of the gum; while in other cases, but less frequently, it may open into the nasal fossa or the maxillary sinus, according as the tooth may be located in the anterior or posterior part of the mouth.

Chronic inflammation of the lining mucous membrane of the accessory cavities, from whatever cause, produces thickening and induration, a partial closure of the opening into the nasal fossa, and more or less complete retention of the abnormal secretions. Under these circumstances the secretions, having found an exit into the nasal passages, cause an offensive discharge from the nose and posterior nares, often so closely simulating chronic nasal catarrh as to entirely mislead even the careful diagnostician—the inflamed condition of the mucous membrane being regarded as the primary cause of the affection; while in many cases where the maxillary sinuses are affected the real cause would be a diseased tooth. Without a careful examination of the teeth to ascertain their possible relations to the affection, an error may be easily made in the diagnosis, and the disease considered one of catarrhal inflammation of the lining membrane of the antrum, which—by continuity of structure—has spread from the nasal passages.

During the past few years I have seen several individuals suffering from this form of the disease; some of them having been under treatment for months as cases of chronic nasal catarrh. Very little has been written upon this subject, and although our text-books on general surgery and works on nasal and dental diseases all refer to alveolar abscess as a cause of antral affections, and occasionally of fetid discharges from the nasal passages, yet they devote to the subject in most instances but a few lines or paragraphs, and treat it in such an indifferent manner as really to be of but little benefit to the student or practitioner. Dr. Carl Michel, of Cologne, is credited with having first called attention to the fact that the cause of fetid discharges from the nasal passages was many times to be found in morbid conditions affecting the accessory cavities (the sphenoidal and frontal sinuses, and the maxillary antra). Dr. F. H. Bosworth gives Michel the above credit in his admirable work on "Diseases of the Throat and Nose," and emphasizes the same facts, by saying, "As a consequence of their position, size, and shape, and being almost completely closed cavities, it is easy to understand how a simple inflammation of their lining membrane will very rapidly degenerate into one of the morbid conditions characterized by a purulent discharge, and the secretions being retained soon undergo decomposition. As the result of accumulation of these morbid products in the accessory cavity it becomes distended, and the discharge, now of an offensive character and with a fetid odor, overflows and escapes from its orifice into the nasal cavity." He says further, "A frequent source of ozena is disease of the antrum of Highmore, caused in the majority of cases by carious teeth whose roots project into the floor of the cavity, * * * * but the disease essentially belongs to the anterior nasal cavity." Cohen, in his work on "Diseases of the Throat and Nasal Passages," simply alludes to the subject by saying that among other causes of ozena, "It may be due to caries of an upper tooth with inflammation of the antrum." Dr. D. H. Goodwillie, of New York, in a paper on "Naso-pharyngeal Catarrh," read before the American Medical Association, 1880, also called attention to the fact that maxillary abscess was often a cause of discharges from the nasal passages; but no doubt on account of the length of his paper did not enter into details, or cite cases as I think he might have done, in illustration of the special part enacted by alveolar abscess.

From past experience I am led to believe that this subject deserves more attention than has hitherto been given to it. Its importance in the diagnosis of offensive discharges from the nasal passages cannot be overestimated; for many times persistent, fetid, muco-purulent secretions, discharged from the nasal passages, which have resisted medical and surgical treatment for indefinite periods, may be traced to the evacuation of a chronic alveolar abscess into the maxillary sinus or the nasal cavity direct. I believe the disease is more often found to be associated with the *antrum* than with the frontal sinus as claimed by Bosworth. These conditions are by no means uncommon, and yet they are rarely recognized by the general practitioner, or fully appreciated by the majority of specialists as an important factor among the causes of fetid nasal discharges.

This affection must not, however, be confounded with antral abscess, which is a much more serious difficulty, causing at its inception, rigors and fever, and involving a considerable portion of the antral surface of the maxillary bone and covering periosteum. This membrane is lifted by the process of suppuration and the pus confined between it and the bone, so that it is separated from the cavity proper of the antrum and does not immediately discharge its contents, but by its retention causes absorption of the walls of the antrum, tenderness of the external tissues, sometimes hideous disfigurement, and unless surgically relieved opens into the mouth, orbit, or through the external tissues of the face.

More rarely, however, it discharges into the middle meatus of the nose and escapes from the nostril or posterior nares. Extensive necrosis of the maxilla often follows, and there is one case on record —that of Dr. Mair, of Madras, published in the Edinburgh *Medical Journal*, 1866—in which death resulted in sixteen days. "The post mortem examination revealed extensive necrosis of the maxilla, ethmoid, lachrymal, palatine, and inferior turbinated bones, with cerebral abscess."

Alveolar abscess discharging into the nasal cavity direct from disease of the anterior teeth occurs much less frequently, and the discharge is not so abundant nor so offensive as in those cases discharging into the antrum. This is accounted for by the fact, that the discharge finds more ready exit into the cavity of the nose; therefore the accumulation and retention of the secretions is less likely to occur, and consequently the discharge does not become so offensive. The origin of such cases might therefore be more easily overlooked, and the condition quite likely be diagnosed as one of simple catarrh.

When the morbid conditions are dependent upon a dental abscess opening into the maxillary sinus, the pent-up secretions become very foul, and there is danger of septic poisoning. The health of the individual in these cases usually becomes more or less impaired, he grows despondent, sometimes excludes himself from society, and feels life in his present condition to be almost a burden. The secretion is often quite profuse, and is constantly escaping into the nasal passages, forming crusts and discharging from the nostril. At night during the recumbent position the fluid is discharged upon the pillow, or into the fauces—sometimes in such quantities as to wake the patient with a sense of suffocation. The patient will usually have discovered that the escape of the fluid and crusts is always from the same nostril, and most abundant when lying upon the opposite side. These facts will materially assist in diagnosis. The secretions are also very offensive, sickening to the sufferer, and well-nigh unbearable to his associates. This symptom, however, is a prominent feature of syphilitic and scrofulous diseases of the nasal passages. The presence of foreign bodies also causes ulceration, necrosis, etc.; too much reliance must not therefore be placed upon this as a diagnostic sign.

Pain of neuralgic character and also unilateral is a prominent symptom in the early stages. It usually follows the course of the dental nerves, and later extends to the infra-orbital region and side of the nose. It is aggravated by exposure to cold, and most intense at night. As the disease progresses the pain is diffused over the whole side of the face and frontal region. The superior teeth upon the same side of the mouth will at varying intervals become somewhat sore and elongated; or it may be that a single tooth or root will be thus affected; the discharge also being more abundant at such times. The patient may not have noticed these facts, however, or their coincidence, until after his attention has been drawn to them. A careful examination of the mouth under these circumstances will usually reveal a devitalized tooth or roots in the region of the maxillary sinus; sometimes loose, at other times quite firmly set in the alveolus, but always more or less sensitive to percussion. When there is any doubt about the vitality of the tooth, the application of a piece of ice will effectually settle the question; absence of pain indicating a devitalized pulp.

In illustration of the points which I have made, allow me to present the history of two fairly typical cases, with the treatment adopted.

Case I. Mr. James C., aged 22 years; occupation, student; of robust health; consulted me April 1, 1881, for a discharge from the left side of the nose, accompanied by occasional soreness of the left superior central incisor, and pain in the infra-orbital region. The central incisor had been decayed upon the mesial surface and had caused him a number of attacks of toothache. He finally visited a dentist who found the pulp exposed and highly inflamed. It was devitalized with arsenical paste and afterwards extirpated and the root-canal and cavity of decay filled with gutta-percha. Some two or three weeks later the tooth became sore and elongated, and about this time he first noticed a discharge from the left nostril of very unpleasant odor. The discharge had continued up to this time, a period of about four months. He had noticed that when the tooth was sore to the touch, there soon followed an increased discharge. He had been under treatment about three months for nasal catarrh with no benefit. An examination of the nasal passages revealed upon the left side a slightly congested condition of the mucous membrane, and a small quantity of muco-purulent secretion. The left superior central was found to be the only diseased tooth in the mouth. It was slightly discolored, a trifle loose, and sore on percussion. The filling was removed from the cavity and pulp-canal, and on syringing with tepid water the fluid passed through the apex of the root into the cavity of the nose. The treatment consisted in syringing the cavity of the tooth and abscess through the pulp-canal with warm carbolized water, two grains to the ounce, once daily; packing the tooth with carbolized cotton, and sealing it in with gutta-percha stopping to exclude external moisture. At the end of ten days the discharge had entirely ceased. The root-canal and the cavity were then filled permanently. Four months afterwards the discharge had not returned and the tooth remained perfectly comfortable.

Tomes mentions a single somewhat similar case, in which an abscessed superior lateral incisor discharged into the nose, the pus dripping from behind the velum palati. Garretson records a case reported by M. Fleischman, in the *British Medical Journal*, of a little girl 5 years of age, with an alveolar abscess connected with the right superior cuspid opening into the nasal passages and causing a slight purulent discharge from the right nostril. He also says several cases have occurred in his own practice where the abscess discharged into the nares, the disease being in each case associated with a central incisor. Wedl mentions two cases of penetration of the floor of the anterior nasal region by abscess originating from lateral incisors.

Case II. Mr. J. B., aged 40, merchant; general health not very good; called Jan. 10, 1880, for dental operations. I noticed an offensive odor from the breath resembling that of chronic nasal catarrh. On calling attention to this condition, the patient stated that there had been a discharge from the right nostril, accompanied by neuralgic pains in that side of the face; that he had been for several months and was still under treatment for nasal catarrh, but could see no improvement. The discharge was at times quite abundant and very offensive, while at other times it was much less in quantity. It always came from the right side of the nose, or dropped into the throat when lying upon the back. The membranes of the nasal passages were considerably inflamed; upon the right side the passage was somewhat contracted by thickening of the membranes, and the surfaces were covered with crusts of the dried secretions. The discharge was more abundant after taking cold. On questioning the patient I found that the teeth of the right superior maxilla were always somewhat sore and elongated at such times, but not sufficiently so to drive him to seek professional advice for this trouble. Examination of the mouth discovered the first superior molar to be in a devitalized condition, and to contain a large crown filling of amalgam. It was tender on percussion, and somewhat loose. The fact of the devitalized and tender tooth being upon the same side with the nasal discharge, led me to suspect some connection between the two conditions. The amalgam filling was therefore removed, and upon cutting into the pulp-chamber it was found to be filled with highly offensive pus. The cavity and pulp-chamber were then washed with warm water and the roots explored with a fine probe, which could be passed upwards through both buccal roots fully an inch and three quarters. With the syringe water could be thrown into the antrum of Highmore through the roots of the tooth, the fluid escaping into the nose. The offending tooth was extracted, and immediately a considerable quantity of offensive pus escaped into the mouth through the alveoli. The ends of the buccal roots were found to be somewhat rough, and a portion had been removed by absorption. The alveoli and antrum were syringed with carbolized tepid water, and the opening into the mouth lightly plugged with a carbolized-cotton tent. This treatment was followed each day for a month, and at the end of that time (February 10) the discharge had entirely disappeared from the nasal passages. The perforation in the antrum was kept open for a number of weeks afterwards, and finally allowed to close, as no further trouble occurred.

Heath, in his work on "Diseases and Injuries of the Jaws," mentions a case of alveolar abscess of a second bicuspid, in a gentleman 54 years of age, that opened into the antrum and caused a purulent discharge from the nasal passages. Garretson mentions a case occurring in the practice of Dr. J. D. White, of a young man, 20 years of age, suffering from a fetid discharge from the right nostril dependent on antral abscess caused by a diseased second molar.

Oral examinations should always be made in all cases of purulent discharge from the nasal passages. I am convinced that if such examinations were made by specially qualified persons, with the same degree of thoroughness and care as is usually given to the examination of the nasal passages, many otherwise obscure cases would be found to have their origin in alveolar abscess discharging into the maxillary sinus or nasal passages direct.

RADICAL AND HEROIC TREATMENT OF ALVEOLAR ABSCESS BY AMPUTATION OF ROOTS OF TEETH.

BY J. N. FARRAR, M.D.,D.D.S., NEW YORK CITY.

As the present paper is intended to follow and be a part of a series of papers already published, such as may desire to read those are referred to the issues of November, 1876; July, August, September, and October, 1878; July, 1880, of the DENTAL COSMOS, and the issues of April, May, June, July, August, September, and October, 1879, and October, 1880, of the *Missouri Dental Journal;* where not only is the radical and heroic practice advocated as being the most scientific, but the comparative and relative values of acid and creasotic medicines are set forth as demonstrated by many years of successful practice, and substantiated by numerous careful experiments in the laboratory. Although these papers are divided between these two journals, each set apparently complete in itself, each really embracs only a section of the subject, thus rendering their union necessary in order to cover it entirely.

Exhaustive as these papers may appear, and radical as the system advocated may seem, I have reserved until now the explanation of the most heroic, and in some respects the most interesting, of all the operations. As in the case of the others, it may at first seem impracticable to adopt it as part of a system, yet the time will come, as it has already come with the others, when it will not only be considered as highly scientific, but will be indorsed by all progressive operators.

This operation has for its special object the radical removal by amputation of any portion of roots of teeth that can be of no further use; in order to enable nature to have a better chance for cure. If an entire tooth should be extracted from a diseased socket, the treatment might be termed highly radical, so far as the socket itself is concerned; and, in some cases, it might be the best thing to do, especially when the circumstances of the patient are considered. But, taken in connection with the preservation and usefulness of a valuable tooth, such treatment might not only be unwise and unnecessary but absolutely wrong and unscientific. There may, however, be an instructive lesson in the examination of such treatment followed by the rapid cure by mother nature. For, if such a cure will follow the extraction or the removal of an entire tooth, may it not also follow the removal by amputation of the offending portion only, if that can be done so as to leave the remaining portion of the tooth useful to the patient? Nine years of successful practice of this operation, after eleven years of ups and downs in trying to save such fargone cases by the old-fashioned palliative treatment, warrants me in giving a decided reply in the affirmative.

These operations, which will be diagramatically illustrated in another paper, consist simply, as already said, in the amputation of all those portions of the affected root or roots which by disease have been rendered useless for contributing to the stability of the crown, the extent of the disability depending upon circumstances,—embracing not only the tooth itself, but especially also the adjacent alveolar regions. The amputated portion may vary from a small extremity about the apex to the entire root, depending upon the extent of its degeneration, but more generally upon the degree of destruction of the socket-walls.

Roots that are slightly softened or decomposed about their apices, from the immediate presence of disease and pus-detritus, may be successfully treated by the old and well-known operation of scraping. But in other cases there are roots more extensively degenerated, and rendered nearly or quite useless for the maintenance of the stability of the crown, on account of the extensive waste and destruction of its alveolar support, leaving it not only naked but in such an exposed condition as to serve as an ugly snag for catching and retaining food, which decomposes and becomes the source of constant irritation—a cesspool of filth, bad odors, and painful torments,—which not only proves a hindrance to treatment, but renders a cure liable to be only of short duration, and which often, after the most conscientious efforts of the operator, may reflect upon his reputation. Such roots (which occasion the difficulties) require a far different and more heroic treatment. It is not so much the faithful efforts of the operator that redound to his credit, as the permanency of his cure. A bold act, which removes the entire cause and which will lead to a permanent cure, may not only be the best in the end, but the most humane.

(To be continued.)

TRANSLATIONS.

SYPHILITIC TEETH.

(Translated for the DENTAL COSMOS from the French of ALFRED FOURNIER, by J. WM. WHITE, M.D., Lecturer on Venereal Diseases and Operative Surgery in the University of Pennsylvania, and Surgeon to the Philadelphia Hospital.)

(Continued from page 25.)

DENTAL erosions are now known to us as far so the lesions are concerned; but many essential peculiarities of their clinical and anatomical history remain to be noticed. A word or two on their habitual seat. They can affect both dentitions, but they are observed more frequently on the permanent than upon the temporary teeth. In the second dentition (which we have to consult particularly for special diagnostic signs), dental erosions are met with in the order of their frequency: First, on the first molars; second, on the incisors; third, on the cuspids. The first molars, especially those of the lower jaw, are most frequently affected by the erosion.

To start with, therefore, we can establish the principle that, if any class of teeth is touched by the erosion, it is an exceptional case where the first molars remain intact; and it is not rare that they alone are attacked, to the exclusion of other teeth. Inversely, there are dental groups which are almost invariably exempted by the erosion. These are the bicuspids and the second and third molars.

Note the following propositions: First, dental erosions are almost always multiple. At the least they affect two teeth; much more frequently four, six, eight, ten; sometimes twelve or sixteen. It is an extraordinary case to find but one tooth eroded. I have, however, a case of this kind in my practice. A young man, son of syphilitic parents, and syphilitic himself from birth, presents a first inferior molar affected with the most marked cuspidian atrophy, while the remainder of his teeth are entirely exempt from the slightest alteration.

Second, dental erosions are nearly always symmetrical—that is to say, they affect homologous teeth in a like manner. So that, for example, if the right lower cuspid has an erosion on its crown, there is every chance in favor of finding the same lesion on the left lower cuspid. To this law of symmetry there are but very few exceptions.

Third, erosions of corresponding teeth maintain the same level on the crown. That is to say, if an erosion is situated at a given height on the crown of a tooth on the left side, the corresponding tooth on the right side will present an erosion situated precisely at the same height on its crown. For example, let us imagine a lower central incisor of the left side presenting a transverse furrow at the union of the upper third with the lower two-thirds of its crown; you will almost invariably find on the corresponding tooth of the right side an identical furrow situated at the same height. In the same way, suppose it to be an angular notch occupying the crown of a lower cuspid; almost certainly the crown of the other cuspid will be the seat of a similar lesion, and so of any other variety of erosion.

Fourth, erosions are situated at different heights on teeth of different classes; and these differences of level are in precise anatomical relation with the chronological differences of eruption of these different teeth. If we compare two eroded teeth of different kinds in reference to the level of the crown at which the erosion has taken place on each of them, we find that it is seated at different heights. Take, for example, a cuspid and a central incisor of the lower jaw. On the cuspid, the erosion will occupy the edge of the tooth; on the incisor, it will be situated from one to two millimeters from the edge. The differences which intervene in the reciprocal development of different classes of teeth correspond exactly with the differences of level in the erosion of these same teeth. The cuspid is later than the incisor in the beginning of development; it commences to calcify later, and, at the time when its crown is only in the early stages of formation, the incisor already measures one or two millimeters of finished dentition. There is, therefore, a precise connection between the height of the erosion on the crown and the stage of dental development at a given time. These technical details are indispensable in order to properly interpret the pathogeny and the semiological value of the dental erosion.

A slight glance at the pathological anatomy will serve to complete the argument. If we make a vertical section of a tooth affected with erosion, we perceive at first, with the unaided eye or with the help of a magnifying glass, that the profile of the tooth offers one or many sinuosities, with roughened bases, irregular and blackish. These sinuosities are nothing more than the results of erosion, encroaching upon and excavating the dental substance to various depths. At times the lesion affects the enamel alone, of which a layer, thinned and changed, is found at the bottom of the cavity; at others it penetrates to the dentine. On microscopic examination the enamel appears chipped off even with the edge of the lesion. Its tubes are broken at unequal heights, and their extremities form an irregular, roughened surface. They seem to have lost their reciprocal cohesion, and to be but imperfectly joined one to the other. Above and below the erosion the enamel assumes its normal condition. Up to this point there is nothing extraordinary, and nothing unexpected. But the condition of the dentine has a surprise in store for us. At the level of the erosion, and only at this level, the dentine is affected, the alteration following the track of a horizontal zone corresponding to the plane of the erosion. If there is but one erosion, we find but one band of dentine changed in this way; but if there are several, as in the "step-like" teeth, we find an equal number of diseased zones of dentine, separated by zones of healthy dentine,—a topography certainly of the most curious and instructive kind, from a pathological stand-point, as we shall see later. Through the entire thickness of the zones corresponding to the erosions, the substance of the dentine is altered in a special manner. It would be going away from my subject to describe to you the anatomical details of this lesion. It will suffice for me to say that we there observe a form of degeneration of dental tissue characterized chiefly by an anomalous texture of the dentine, termed in special pathology globular transformation of the dentine. This lesion is well known to odontologists, and is considered by them to depend upon a vicious nutritive formation of the teeth.* It is not a simple erosion of the surface; anatomically, it is at the same time a superficial and a deep lesion—a lesion of the whole tooth.

From the preceding data we can form an idea of what dental erosion is, of its pathogeny, and of the mechanism of its production. A few general propositions in recapitulation will embody our conclu-

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* *Vide* Magitot,—op.cit.

sions on this subject. First, dental erosion is a lesion contemporary with the formation of the tooth. This is very plain, since the eroded tooth leaves its alveolus in an eroded state, and since we find it eroded in its alveolus when we take the trouble to look for it there. The erosion is the stigma of a lesion finished during the alveolar life of the teeth. Second, dental erosion is the consequence of an interruption occurring during the process of dentification at the time of the forming of the tooth. In a tooth thus affected, a portion of of its substance is lacking, and this portion is lacking, not because it has been destroyed, but because it has not been formed. It is apparent that this interruption of formation was temporary, since above and below this unformed portion of the crown we find the tooth normal and regular. It is thus demonstrated that this stage of non-formation had but a short period of duration. A tooth is, let us suppose, in course of formation, and its summit is already covered with a solidified zone, which in technical language is called the dentinal cap. If things followed their habitual and normal course, this process would continue in the direction of the neck, and would end by forming a regular tooth. But a morbid element makes its appearance which disturbs the nutrition of the organ. Under this influence an insufficient quantity of nutritive materials is appropriated; the cells which should, by becoming incrusted with calcareous deposits, prolong the dentinal cap, undergo a sort of atrophy; calcification is suspended, or is accomplished in an improper or defective manner, and, as a consequence, a dental zone is imperfectly and incompletely formed *flatwise* on the crown. The erosion formed, the morbid element ceases to act, dental nutrition begins again, and the tooth again takes on normal growth. There always remains, however, between the two normal segments, the intermediary atrophied zone, in the state of an indelible, irreparable lesion.

Such is the process of erosion, and we may add to this pathogeny the few following corollaries: It is natural that the importance of dental erosions in regard to extent and depth should be in keeping with the intensity, the character, and the duration of the intervention of the morbid cause from which they proceed. If this cause is powerful, active, intense—if it is of long duration—the result will be an extensive erosion. If the cause is slight and of short duration, the erosion which results will be but superficial, and proportionately less. If the cause makes itself apparent at different periods, with intermissions when its action is suspended, several successive erosions will be produced on the crown in such a way as to produce what is called the "many-furrowed" tooth, the "step-like" tooth, etc. All this is at the same time simple and logical. These inductions begin to step beyond the pale of hypothesis. They will soon be recognized, I am convinced, as indisputable facts.

Dental erosion is the result of a morbid influence of a general character. If the cause determining the erosion were purely local, its action would be confined within corresponding limits,—an altered tooth, or a group of neighboring teeth affected in an identical or analogous manner. Suppose, for example, a case of periostitis—a local cause—developing, let us say, in the left half of the lower jaw. Such a lesion could certainly affect the teeth comprised in this left half of the lower jaw and cause a stoppage of formation, dystrophia of one form or another; but it would limit its action to that point. It could exert no influence whatever on the teeth of the other half of the lower jaw, or upon those of the upper jaw. A local cause is competent to produce only local results. A local cause is absolutely insufficient to account for the conditions noted in dental erosion, viz.: First, multiple and wide-spread changes of the dental system, affecting both jaws; second, symmetrical changes affecting homologous teeth; third, systematic changes, affecting at the same level teeth of the same class and at different heights dissimilar teeth. It is evidently only a general cause which can act as the origin of such lesions. I do not pretend that there are not dental changes derived from other than general causes. There are many which result from causes entirely local, notably bony affections. But these differ absolutely from those which have just occupied our attention, especially in their exclusively local topography.

Dental erosion, therefore, as it shows itself ordinarily,—that is to say, as a collection of multiple lesions, widely spread, symmetrical, systematized, etc.,—cannot be considered as an affection of one or several teeth; it represents an affection of the organic system. It would be inexplicable by the action of an entirely local cause. It is of necessity the product of an influence of a general kind, the character of which we have especial interest in knowing, and which it remains for us to seek out.

There are questions in pathology which constitute true apples of discord, giving rise to opinions most contradictory, and becoming involved in interminable controversies. The one of which we are about to speak is of this number. Let us proceed at once to the facts.

There are three principal opinions as to the etiology of dental erosion. According to some, dental erosion has no relation with syphilis, but is connected with a special affection of infancy, eclampsia. According to others, it is always and exclusively the result of hereditary syphilitic influence. Finally, according to others still, it is simply an ordinary lesion, but originating from syphilis with a marked frequency, and even appearing to originate from it alone in one of its forms,—the Hutchinson tooth. Let us endeavor to unravel the clinical truth from the midst of this conflict of theories.

The first of these opinions has been upheld by a distinguished physician, an eminent specialist of the dental art, M. Magitot, in his "Treatise on the Anomalies of the Dental System",[1] and developed since then in different publications or in the learned societies[2]. Furthermore, some of his students, Messrs. Castanié,[3] Rattier[4], and Quinet[5] have adopted and spread the doctrine of their master, sometimes even exaggerating it. M. Magitot has built up and defended his theory in a most scientific manner. In the first place, he has furnished for the support of his conclusions a large collection of facts. In one of his memoirs, for example, he quotes no less than forty observations relative to patients who, affected with dental erosion, "had all presented in their infancy symptoms of eclampsia, without any other malady to which could be attributed the lesion of the dental system." He has also produced in favor of his doctrine divers arguments, some of which have a very high value. Thus, to quote but one, "one could in a number of cases establish a connection strictly exact between the age when the eclampsia occurred and the level of the crown where the erosion took place." He believes this connection to be constant. "Today," he adds, "we do not confine ourselves, in presence of this dental lesion, to an assertion of the previous occurrence of eclampsia; we go further, and, from the level of the notch or the furrow, we name the date of the convulsions," etc. In other words, given a dental erosion, it would be possible from its level on the crown, to establish that a convulsive attack took place at such or such an age,—that is to say, corresponding to such or such a degree of development of the tooth. The eclampsia itself, in some manner, marks upon the dental crown the date of its appearance. It thus seems incontestable that infantile eclampsia can be the cause of dental erosion. I accept this conclusion, because it appears to be impossible to refute or disregard it. But, this granted, is eclampsia the sole cause of dental erosion? "Yes," reply M. Magitot and his partisans. "No," we reply with no less confidence.

In establishing eclampsia among the etiological antecedents of erosion, M. Magitot has perceived and established an accurate fact, of which we have accepted the authenticity. But, governed doubtless by the idea he followed out, he saw but this fact alone; he has disregarded or wrongly interpreted the cases which did not support his theory or which might have opposed it. He has generalized a particular fact, in giving as an explanation of *all* dental erosions that which is applicable to but a certain number. If we study without preconceived ideas on the subject the antecedents of patients affected with dental erosion, we find a considerable number of cases where the theory of eclampsia fails us entirely. If necessary to cite particular examples the only embarrassment would be in making a choice. A single case only I shall borrow from my notes—one which gives place to no error, to no possible suspicion of non-observance or failure of memory in reference to the eclampsia. A young child, on whose account I have been many times consulted, presents absolutely typical dental erosions. This child, an adored son, has always received the most extreme attention to the slightest details of his health. He has been treated from his birth to the present day by my colleague and friend Dr. R. Blache. There has not been one of his most trivial indispositions, for which M. Blache or myself, or sometimes both of us at once, have not been summoned to him. Well, this child, notwithstanding his dental erosions, never had the shadow of a convulsion or anything that could in any way resemble one. This M. Blache recently stated to me; and the father and mother, who have not lost sight of their child for a single day since its birth, confirm this assertion. A single fact like this would serve to explode the exclusive theory which ascribes to eclampsia all the cases of dental erosion. But facts of this kind abound. Therefore, while admitting that eclampsia can act as the origin of dental erosion in a certain number of cases, we claim that it is not the sole cause which may produce it.

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[1] Treatise on the Anomalies of the Dental System of Man and the Mammals. Paris, 1877.

[2] Clinical Studies on Erosion of the Teeth considered as a Retrospective Sign of Infantile Convulsions. Paris, 1881.

[3] Of the Erosions or Alterations of the Permanent Teeth following the Diseases of Children. Paris, 1874, Thesis No. 384.

[4] Contribution to the Study of Dental Erosion. Paris, 1879, Thesis No. 569.

[5] Apropos of Syphilitic Teeth. 1879.

I have only to reverse the order of the statement with reference to the theory, none the less exclusive, which attributes to syphilis all that which the preceding one ascribed to eclampsia.

This doctrine originated in England through the labors of Hutchinson. Among ourselves, it has its chief representative in my eminent colleague Prof. Parrot, who has dedicated to it several of his fine lectures upon hereditary syphilis[1]. It can be summed up in this manner: hereditary syphilis is the essential, the unique cause of dental erosion. Here still is partly truth and partly error. It is assuredly an incontestable fact that syphilitic heredity is the true origin of dental erosion in numerous cases. It is absolutely certain that, in a number of patients, the erosion cannot be attributed to any other cause. But it does not follow that dental erosion proceeds invariably from syphilitic heredity. In fact it is not uncommon to meet with dental erosions upon non-syphilitic subjects, born of non-syphilitic parents. I recall a fact which, were it the only one, would settle my conviction on this point. One of my most intimate friends, a companion from childhood, whose whole life I know as he knows mine, has a child who presents four teeth affected by erosion. Neither this child, nor his sister, nor his father, nor his mother has ever had the slightest syphilitic symptom. And how many other analogous observations could I not produce!

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[1] See especially "*Le Progrès Médical*," 1881, p. 359.

There is also testimony drawn from an entirely different class of facts. It is generally accepted that syphilis does not affect the ox or the dog, but dental furrows have been observed on the teeth of these and other animals.[1] In a four-year-old Durham ox, M. Magitot saw the two central teeth affected with erosions, transverse and deep, occupying the upper third of the crown. In the histological examination a zone of globular dentine was found corresponding to the level of the erosion,—a lesion like in every point to the dental erosion of man. Likewise, M. Capitan recently showed to the Society of Anthropology the jaw of a dog affected with multiple dental erosions. From all this, then, a final conclusion is reached, viz., that syphilis is not the sole origin of dental erosion.

We have thrown aside as inadmissible the two absolute doctrines which attribute the origin of dental erosions exclusively to eclampsia or to syphilis. It remains for me now to expound and defend a third doctrine—or, if the word appears a little ambitious, a third opinion—to which I have been led by my personal experience, no less than by the works of my predecessors. This opinion, which alone seems to harmonize the clinical facts, may be summed up under three heads in the following manner: First, the dental malformations known under the name of erosions are commonplace lesions, susceptible of derivation from diverse and multiple causes; second, syphilis is sometimes and perhaps oftener than any other cause the origin of these conditions; third, from the special point of view which occupies us—that is to say, as symptoms competent to aid in the retrospective diagnosis of hereditary syphilis—dental erosions have a very unequal value, according to the forms which they assume. Some of these forms, resulting with an undeniable frequency from causes foreign to syphilis, have no diagnostic signification; while others, caused almost alone by syphilis, constitute nearly positive signs of specificity. We shall endeavor to justify this triple proposition by as rapid a discussion as possible.

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[1] According to M. Rattier (Thesis quoted p. 86) M. Duval "has made a collection of eroded teeth, among which are found the teeth of the horse, the elephant, and the hippopotamus."

First, dental erosions, we have said, are but commonplace lesions, manifestly derived from multiple and diverse causes. What, then, is dental erosion? It is, very evidently, as acknowledged by all, a lesion of nutrition. We have seen that it results from a temporary interruption in the process of dentification. At a certain stage of its evolution the tooth does not receive the amount of nutritive material necessary for its proper formation. As a consequence, it is viciously and incompletely constituted, at this period; and this arrest of development, this disturbance of nutrition, shows itself on the crown by an atrophic zone which we call erosion. Then, *a priori*, is it possible to admit that syphilis alone has the power of inducing a nutritive disturbance in the dental system? On the contrary, is it not probable that a lesion of this kind, without specific character, may originate from any morbid cause giving rise to a profound disturbance of the general nutrition? *A posteriori*, it follows that dental erosion arises from multiple causes, since we meet with it in divers conditions—that is to say, for example, in patients who have not had syphilis, as in patients free from eclamptic antecedents. It follows that the cases which are explained neither by syphilis nor by eclampsia should be explained by other morbid influences.

Without doubt science is still far from being settled upon the etiology of dental erosions, but numerous causes to which they have been attributed, such as eruptive fevers, pyrexiæ, scrofula, rickets, etc., are absolutely inadmissible in many cases in which they have been cited; for the reason that the teeth were already definitely formed, and consequently not susceptible of malformation at the time when these causes *could have had any effect*.[1] Some carefully observed facts attest, however, in a very definite manner the etiological connection of certain morbid conditions with the erosion. Thus, M. Magitot has related an interesting observation of dental erosions caused by a chronic enteritis. In this case, the incisors, the cuspids, and the first molars were in a state of complete disorganization, as in the form called "honeycomb." There the seat and the extent of these lesions offered a precise connection with the invasion and the long duration of the enteritis, which, having begun in the second month, was prolonged to the second year. The second and third molars, the evolution of which, as we know, occurs after the second year, presented no alteration whatever.* Likewise, M. Pietkiewicz observed the following fact, which he has been kind enough to communicate to me. A young man of nineteen presented himself to him affected with numerous dental erosions. From the seat and the extent of these erosions, our skillful confrère decided that the morbid cause from which they sprung should have occurred at the age of from eighteen months to two years. He looked up this case, and learned that at the age of eighteen months his patient fell from a first story; that he suffered from several wounds in consequence of this fall, and that on account of this he was compelled to remain in bed several months in a most serious condition.† It is useless to further insist on this first point which is accepted by the great majority of physicians.

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[1] This M. Parrot has authoritatively demonstrated (*Le Progrès Médical*, 1881) so that I have nothing to add or to modify.

Let us consider the second point. The pathogenic relation of dental erosion with syphilis springs from numerous considerations, of which it will suffice to cite the principal ones, viz.: First, frequent verification of previous attacks of syphilis in the parents of patients with dental erosions. We could borrow examples by the hundred from Hutchinson, from M. Parrot, and from others who have occupied themselves with this question, without reference to about one hundred and thirty cases from my personal notes. These observations may be thus summarized: Patient affected with dental erosions; on this account syphilitic heredity suspected; interrogation of the parents, who acknowledge syphilis previous to the birth of their child. Example—a child of a dozen years is sent to me by one of my colleagues, on account of an ulcerative lesion of the velum, which I diagnose to be a gumma. I examine the teeth, and find the erosions of such a nature as to confirm my suspicions. I then question the father of the little patient and learn from him: First, that he had syphilis a short time previous to his marriage, and that he was incompletely treated for it. Second, that he had the misfortune to communicate syphilis to his wife in the early period of his marriage. Third, that the first-born child died of syphilis. Fourth, that his second child (the one I am consulted about) had in his early months divers symptoms which were considered to be syphilitic, and were treated and cured as such, etc. Facts of this kind abound—they are innumerable.

We frequently discover in patients affected with dental erosions either syphilitic antecedents, or actual symptoms of syphilis. Examine a certain number of persons affected with dental erosions, and you will recognize—not upon all, but upon the majority—evidences of syphilitic heredity. You will be duly enlightened as to some of them by an exact clinical history. Among others, you will find the manifest remains of specific symptoms—cutaneous cicatrices, cicatrices of the mucous membranes, corneal opacities, perforation of the velum, nasal flattening, cranial protuberances, lesions of the long bones, etc. Finally, in others, as in the case before mentioned, you will be enlightened at once by the actual existence of undoubted syphilitic lesions. Of this kind, the examples are likewise very numerous. The three following cases, taken at random, will answer as specimens. In an observation of Coupland, a young girl of 13 years, presenting dental malformations and corneal opacities, was attacked with visceral symptoms, to which she succumbed. The autopsy showed, among other lesions, hepatic gummata.* Archambault relates the case of a child born of a syphilitic mother, who was affected, at about the age of three months, with typical secondary symptoms, and later presented an absolutely vicious second dentition—serrated erosions, vertical flutings, etc.; and at 12 years of age, had exostosis of the tibia and of the metatarses.† Cheadle reports a case of dental malformations in a girl of eight years, with other syphilitic manifestations, viz., keratitis, nasal lesions, necrosis of the palate, rupia, facial tubercles, tibial nodes, parietal periostosis, etc.‡ Such facts, joined with many other similar ones which I could cite, are demonstrative.

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* Clinical Studies on the Erosion of the Teeth, p. 6.

† Unpublished observations.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION—TWENTY-THIRD ANNUAL SESSION.

(Concluded from page 33.)

Fourth Day—*Morning Session.*

Dr. H. J. McKellops, president of the Southern Dental Association, extended a cordial invitation to the members of the American Dental Association to meet with them at Lexington, Ky., the first Tuesday in May, 1884.

On motion of Dr. Crouse the secretary's salary was increased to $200, the increase to apply to the past year.

Section IV., Operative Dentistry, was called. The chairman, Dr. Darby, reported that no papers had been presented, but that in their stead the Section would suggest the following topics for discussion:

1st. "Treatment of Children's Teeth, and the Best Material or Materials with which to fill Young or Uncalcified Teeth."

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* *Medical Times*, 1880.

† *Union Médicale*, Jan. 21, 1879, p. 93.

‡ *Brit. Med. Jour.*, 1880, p. 204.

2d. "The Use of Textile Metals and the Combination of Tin and Gold;" also, the "Combination of Gold and Amalgam in the same Cavity."

3d. "Irregularities of the Teeth and the Methods employed for Correction:"—the discussion upon this subject to be opened by Dr. Keely.

Dr. Taft. There is very great diversity of opinion and practice with reference to the management of the temporary teeth, and a very great want of knowledge on the part of the people of the value of these teeth and, he believed, a want of proper appreciation in the profession of the importance of preserving them in the best possible condition during the time they should remain in the mouth. Hence they are allowed to decay. The temporary teeth and the parts about them should be kept in good condition; but instead of this we see them going through various stages of disease without an effort to stop it. Regular patients should be sufficiently well informed to know that when the temporary teeth are neglected, as they frequently are, the rudiments of the permanent teeth are endangered. Parents should be informed that the temporary teeth ought to be kept thoroughly clean, and that their children should be fed on food that would give the teeth proper exercise in mastication. Incipient decay, when it makes its appearance, should be removed, and when necessary filling should be resorted to. In such cases what are known as temporary stoppings may be used. There are many materials which are sufficient for the purpose,—tin, Hill's stopping, gutta-percha, oxyphosphate, oxychloride,—any of the plastics. It is not often that the temporary teeth require to be filled with gold. The materials at command are well adapted, not only as regards their character, but also as regards their ready application in a brief time.

Dr. W. P. Horton, Cleveland, thought that right here was where the subject of dental education began. Much of the trouble in the treatment of teeth arises from the fact that the people are not properly instructed, and that physicians, as a rule, are not posted regarding the necessity of the care and preservation of the temporary teeth. They suppose that these teeth can be taken out if they cause annoyance and that their places will be supplied by the permanent teeth in a very short time. To remedy the evil which this widespread belief causes is a task the dentist has to contend with all the time. Dr. Horton related a case which occurred three years ago, as illustrating his treatment of children's teeth when decayed. A little boy of six years of age was sent to him, with the pulps of the first inferior temporary molars exposed. The first permanent molars were decayed when they were erupted, and before the child was six years old the crowns were gone and the teeth had to be extracted because of the irritation they caused. If the temporary molars also had been extracted he would have had nothing with which to masticate for several years. They were cleaned carefully without puncturing the exposed pulps, which were then touched with oxide of zinc. Oxyphosphate, mixed to the consistence of cream, was then dropped upon them and allowed to harden; in a few minutes, more oxyphosphate, mixed a little thicker, was applied, and also allowed to harden; after which the filling was completed with gold and platinum amalgam, from which all the mercury that could be got out was expelled, applied with a warmed instrument. He had seen the case lately,—three years after the operation,—and he was sure the pulps in those two teeth were alive. Such in brief was his treatment of temporary teeth, modified, of course, by circumstances. The temporary teeth, in his opinion, should not be extracted as long as vitality remains in them. A few months since he extracted six temporary roots from the mouth of a young lady of twenty-six years. Their retention shows how long they will remain when not taken out by the ordinary process of nature. In this case the roots were apparently healthy, but they were of no use, and they should have been taken out earlier. There were only a few cases in which he would remove a temporary tooth: where malarial trouble is causing the death of the pulp, where swelling is set up and causes local irritation, or where the permanent teeth have erupted and are coming up alongside of the temporary teeth, so that there is no possibility of the absorption of the roots of the latter,—but in no other case, and never prematurely. In the great majority of cases, nature does the work better than the dentist can.

Dr. S. C. G. Watkins. What would Dr. Horton do in the case of a young lady of nineteen years of age who has not yet lost the second temporary molars? They seem to be firm and free from decay, and there is no sign of the coming of the second bicuspids.

Dr. Horton. I would let the temporary molars remain; would not extract in anticipation. The germs of the permanent teeth may be lacking.

Dr. Watkins. Don't you think that nature would supply the germs if the temporary teeth were removed?

Dr. Horton. If you are sure the permanent germs are there, extract; if not, let it alone.

Dr. M. L. Rhein, New York, differed with Dr. Horton in this matter. A gentleman came to him with a swelling in the region of what should be the sixth-year molar, stating that for three years previous he had had a similar trouble each year at about that time. After reducing the swelling he found that the second temporary molar was the cause of the trouble. The tooth was extracted, when it was found that the root was entirely absorbed, and the second bicuspid was immediately beneath it. He had not seen the patient since, but he was satisfied that the tooth would not come into its regular position. He had seen quite a number of cases in which the second bicuspid erupted in a very irregular position, a state of affairs which he believed was caused by allowing the second temporary molars to remain too long. In the case related nature has been endeavoring to throw off this tooth for four years, but she had not succeeded, because, although the roots were absorbed, the crown was wedged between the first bicuspid and the first permanent molar. The patient's teeth were very irregular. The four temporary cuspids had been allowed to remain because his dentist did not believe in extracting the temporary teeth. The consequence is that, with eight cuspids in position and a number of the posterior teeth lacking, a worse state of affairs could hardly be imagined. Dr. Rhein instanced another case in which, through allowing the temporary molar to remain in the mouth until the patient was about eighteen years old, the second bicuspid had erupted with the buccal surface turned toward the posterior approximal surface of the first bicuspid. He thought a great deal of harm was done by allowing the temporary teeth to remain in the mouth too long.

Dr. Watkins. Nothing has yet been said about the treatment of children's teeth when the pulp is dead or abscessed. He had found iodoform an excellent remedy. He used it according to the formula which Dr. Bödecker, in one of his papers read before the New York Odontological Society, had quoted from a German investigator, and he had yet to see the first case where there was inflammation after its application. He had been using it about a year, previous to which time he had tried various other remedies, but they frequently failed in his hands, while this acted like a charm. He had not had a single failure. With regard to capping the pulps of temporary teeth, his experience had been that they did not die so easily as the pulps of the permanent teeth. He had used the same preparation of iodoform for capping the pulps of temporary teeth, filling directly upon the capping at the same sitting,—so far, without a failure,—and he would recommend a trial of it to those who had not used it. Speaking of children's teeth, he had under his care a child (?) of forty-five years, weight two hundred pounds, who has not yet cut her wisdom-teeth. She is troubled a great deal with neuralgia. All the rest of the permanent teeth are in position, but there has never been any sign of the wisdom-teeth. He would like to know if it is the wisdom-teeth which are causing the neuralgia, and if removing the twelfth-year molars would be likely to cure it by giving the wisdom-teeth a chance to erupt.

Dr. C. S. Stockton, related the case of a lady of sixty who asked his advice about what had been pronounced by two physicians to be necrosis of the jaw. On examining her mouth he told her the necrosis could be cured in half a minute; and, picking up a pair of forceps, he extracted a cuspid that had lain dormant for years, and had recently erupted owing to the pressure of a rubber plate she had been wearing, causing what the physicians had called "necrosis." The "necrosis" was cured by the operation. Another case he reported was of a gentleman who had a pulpless wisdom-tooth, which had been in that condition for twelve or fifteen years, but as it finally began to be troublesome, it was extracted; ulceration ensued, and his family becoming worried about blood-poisoning, sent for a physician, who insisted upon the patient's applying warm poultices. The patient was a large, fleshy gentleman, and the case one that could be readily controlled, but for the physician's advice; but to quiet the nerves of the family Dr. Atkinson was sent for. Very much to the relief of the family Dr. Atkinson prescribed ice. Dr. Stockton doubted if the patient would have been alive to-day if the family physician's directions had been followed.

Dr. Horton reported a case that had been diagnosed by a physician to be disease of antrum. He (Dr. Horton) thought it was not; and on examining with a probe he found an unerupted tooth, which on being removed, proved to be the perfect crown of a deciduous tooth.

Dr. Buckingham didn't see that we were getting much information in regard to the treatment of children's teeth. What we want to know is not the measures adopted to meet extraordinary cases, but the general treatment of children's teeth as they come to us, more or less diseased. If they are badly decayed, what shall we do? Shall we destroy the pulp and fill, or shall we extract? If we extract, what harm will be done? Will extraction cause the permanent teeth to be irregular? What is the best treatment, is a question of considerable importance which has not yet been decided. If we decide to destroy the pulp and fill, shall we use arsenious acid or some other medicine? We must bear in mind that the structure of the temporary teeth is less dense than that of the permanent ones; hence, we must use gentler means in dealing with them. He had no doubt that the use of iodoform will do a great deal of good. Its composition is the same as chloroform, with the addition of iodine. He had no doubt the same effect could be produced with tincture of iodine in combination with chloroform. But the iodoform answers the purpose better in that it is already in combination, and is more readily broken up by the action of fluids. Oxide of zinc with creasote will form a more perfect covering over a wound than anything else we can get. The oxide of zinc is congenial to the tissues, and the creasote is antiseptic and anesthetic. You will get good results from using the oxide of zinc in immediate contact with the pulp, and then covering with whatever you choose. Amalgam or oxychloride may be used if desired. The greatest objection to the last named is that it is liable to be washed out by the fluids of the mouth. He had used amalgams frequently, and it seemed to make very little difference which one was used. He was pretty well satisfied that the darker an amalgam filling became the more perfectly it preserved the tooth.

Dr. S. G. Perry, New York, took great pleasure in caring for children's teeth. He commenced early to urge upon parents the need of constant care and watchfulness. He did not think he had ever filled a temporary tooth with gold; he used tin-foil, oxyphosphate, or amalgam; but to the permanent teeth, from the time of their eruption, he gave the closest attention, filling fissures and grooves in the grinding surfaces at the first sign of softening, often before the teeth are fairly erupted, because the first few months, before the teeth are fairly calcified, are the most dangerous period. At this time the teeth are often covered with a portion of the gum which affords a lodging place for food-débris. Wherever the finest probe will go he cuts out with minim burs, and fills, not always waiting for actual decay. He filled with tin-foil generally, though many times he used oxyphosphate. For patients under ten years of age he filled many cavities in the grinding surfaces of permanent teeth with oxyphosphate, covering at once with sandarac varnish. This material is very easily applied, and if it fails, it is easy to renew. He sometimes used amalgam in the lower teeth and tin-foil in the upper molars. These materials are good for several years, and if they fail in six or eight years permanent fillings of gold can be made, and the cavities will be smaller than if gold had been used at twelve. Operations such as he had indicated can be done so easily that children like to come to have their teeth attended to. As a rule, he did not use gold before the age of ten or twelve; but when he found the teeth of good quality and the child of a tractable disposition he filled with gold without regard to age. In the front teeth of patients up to the age of fifteen years he used oxyphosphate and gutta-percha largely. He preferred to put tin-foil in young teeth in surfaces exposed to attrition, as he had observed that in sheltered places it did not keep bright so well. In temporary teeth which are badly decayed and soon to be lost any way he filled boldly just under the gum margins where necessary.

Dr. J. N. Crouse indorsed largely Dr. Perry's remarks, though perhaps in some cases, particularly where the sixth-year molars are erupted early, he does not drill out so much. His practice was to cut out the fissures and fill with some material that would preserve them three or four years. When the child is tractable and the teeth well organized, so that he can fill with gold without taxing it too much, he did not hesitate to do so at any age. The temporary teeth will frequently hold in their cavities of decay agents that will destroy the permanent teeth, if kept in constant contact with them. To prevent this he would cut the temporary teeth away. He had found that drilling out the fissures without filling would sometimes stop decay. The most important thing to do is to get patients to take care of their teeth. Many parents will, if properly instructed, train their children so that by the time they are ten or twelve years of age they do this part of the work beautifully. He thought we could do more good in this direction than in any other.

Dr. Atkinson related, as coming under the head of operative dental surgery, the case of a cornetist of Gilmore's band, who, while engaged in a game of cricket, was struck in the mouth by a ball, fracturing several of the front teeth, and dislocating the jaw on one side. Dr. Atkinson described his treatment, and showed casts of the case; he anticipated the very best results, hoping for union of the fractured teeth by deposit of secondary dentine.

Dr. C. N. Peirce wanted to say a word about a method of preserving the teeth which he had found very successful. As is well known, Americans have the habit of eating and drinking at the same time, washing their food down with copious draughts of water, tea, coffee, milk, and the like, before it is properly masticated. He believed it was a most pernicious habit, because it deprived the teeth and jaws of their proper exercise. He had several families under his care where the parents interdicted to their children the use of drinks at meals, and compelled them to eat their food as dry as possible, and he was satisfied that the teeth of the children had improved since the adoption of this plan. The important facts are that the teeth receive their proper use and exercise, and the stomach is kept in proper condition because it receives a larger quantity of saliva with the food for digestion. He had gathered some statistics of animals fed on soft foods. The gums become flabby, and the teeth decay and fall out.

Dr. A. W. Harlan had been using for the last eighteen months a different method of bleaching pulpless teeth from those heretofore in vogue. He thought that no escharotic, or acid, or alcohol, or anything of that nature should be introduced into a cavity. To bleach a tooth successfully the rubber-dam should be applied, and the root-canal filled from the apex about one-third of the way down.

All decay (all softened dentine) should be removed, and the cavity washed with water or, preferably, peroxide of hydrogen, and then, when well dried, the tooth is ready for bleaching. The agent he used for this purpose was chloride of alumina ($Al_2Cl_6 12H_2O$), a yellowish, granular, crystalline substance upon which he first began experimenting outside of the mouth some eighteen months since. It is brought into contact with the discolored dentine in the cavity dry and a drop or two of water is added, when the chloride immediately deliquesces, and the discoloration is readily attacked by the chlorine which is set free. If the discoloration is caused by the micrococcus prodigiosus, which produces the red discoloration, it is immediately destroyed. In this remedy we have a very excellent bleacher. One thing should be borne in mind: hydrochloric acid is formed in the cavity and this must be at once neutralized, and the interior of the cavity filled with oxychloride after bleaching. You should never permit the moisture of the mouth to enter the cavity, which should be at once hermetically sealed.

Dr. V. H. Jackson. Is the tooth bleached by this method inclined to return to its original color?

Dr. Harlan. In cases of over a year's standing there is no tendency to re-staining.

Dr. J. R. Callahan had a case similar to that related by Dr. Watkins, only it was worse, if that were possible. In this case he extracted the molar, and the wisdom-tooth made its appearance in ten days.

Dr. Jackson related the case of a patient who after having been under the care of a physician for neuralgia for a year and a half had been sent to him. It was an aggravated case, the paroxysms of pain being very violent; the lightest touch on his moustache would cause agony. His physician had used all the remedies, systemic and local, known to him, and had treated the patient for malaria,—all without avail. On examination Dr. Jackson found one tooth which was sensitive to tapping. He concluded to extract; he did so, and found at the apex of the root a cemental growth or exostosis. He cut off the end of the root, filled the pulp-canal, and reset the tooth. The gentleman had no more neuralgia for three months, but a few days since he returned to have another tooth extracted and reset. Nothing could be found in any of the teeth to warrant such a procedure, and the patient was referred to an electrician by whom he is now under treatment, though no benefit has so far been derived from it. Dr. Jackson would like the advice of those who have treated similar cases successfully.

Dr. Atkinson. Had this tooth which was extracted and reset proper occlusion with its antagonists?

Dr. Jackson. Yes. The arch was perfect, with the exception of one wisdom-tooth.

Dr. Atkinson. Then the cure is in tying the mouth when the patient goes to bed so that he cannot sleep with the mouth open.

The subject of the care and treatment of children's teeth was passed.

Dr. Perry had had a great deal of satisfaction in filling very large cavities with amalgam, and in a few days, after it has crystallized, cutting a narrow groove around the margins and filling with gold. In large approximal fillings which run under the gum this cannot be done upon the portion of the filling covered by the gum, but it is not necessary. He did not look for early failure of amalgam fillings under the gum if they have been carefully finished. Placing the band of gold around the filling as indicated prevents the crumbling of the edges, which in his experience had been the principal cause of failure in this class of fillings. Dr. Perry sometimes restored crowns upon the roots of posterior molars in the following manner: A thin band of platinum as wide as the full length of the crown, is fitted carefully to the root, and soldered. The band is driven only just under the edge of the gum, because he does not believe it good practice to go far under it. It is then filled with amalgam, dovetailed into the root, and articulated while the amalgam is yet soft. Such an operation is not artistic, but it is very serviceable in the back part of the mouth; near the front it is not permissible.

Dr. Marcklein. We can hardly be too careful about driving metal bands too far under the gums. The band is apt to become an irritant. He had seen a great many cases where the Richmond operation had been performed, where owing to the irritation caused by the gold decay had re-occurred and the operation had to be done over. He had used the method just described by Dr. Perry and found it satisfactory. The operation is easily performed and it is very serviceable.

Dr. A. N. Priest had repeatedly filled frail teeth with amalgam faced with gold. It makes a very good operation in those cases—as in feeble, aged, or infirm patients, in children, or in women during pregnancy and after child-birth,—where we would not dare to put in all gold. Such operations may be called patch-work, but they will enable us to make teeth serviceable which could not be preserved with gold. In filling deep cavities his practice was to line with oxyphosphate, to relieve the shock of thermal changes, and complete with gold.

Dr. Watkins, while in Boston some time since had called on Dr. Baker, who had shown him his method of making fillings of gold and amalgam combined. A thin copper band is applied to the root as described by Dr. Barrett yesterday. The amalgam is mixed as dry as possible and packed very hard into the bottom of the cavity, filling the cavity more than half; the upper part of the amalgam, which contains all the excess of mercury, is then removed, and the filling is immediately completed with gold. In finishing the filling it is very easy to trim the amalgam around the cervical wall, while if gold alone were used it would be a difficult matter to be positive that the entire cavity was filled to the walls. Dr. Watkins had used that method for a year and was well satisfied with the results. Frequently, in filling large cavities in molars, in cases where he could cover it up from moisture, he used oxyphosphate to half-fill the cavity, and then completed the operation with gold. He had also used Robinson's material for some months and it appeared to do well.

On motion of Dr. Crouse the rules were suspended, and the motion whereby the prize for best essay on "Etiology" was awarded to Dr. W. D. Miller, of Berlin, was reconsidered, and the report was again referred to the committee on prize essays.

The secretary was authorized to appoint chairmen for such Sections as fail to organize at this meeting, and to assign members who fail to indicate their preference.

After the usual formal votes of thanks the association adjourned to meet at Saratoga Springs, on the first Tuesday in August, 1884.

NEW YORK ODONTOLOGICAL SOCIETY.

Regular monthly meeting, November 20, 1883, at the house of Dr. Wm. Carr, No. 35 West 40th Street.

President Perry in the chair.

Incidents of Office Practice being called for Dr. J. W. Clowes spoke of the necessity of systematic attention on the part of the patient to cleanliness of the mouth. He considered the quill the only tooth-pick that deserves the name, to be supplemented by powder, brush, and floss-silk.

These, said he, are my directions: employ a brush of *medium* size and stiffness *in the morning and at night*, and use powder once a day. Brushing effectually requires a variety of motions—the up and down, the transverse, and the undulating. These will reach every attainable surface, and their *touch of friction on teeth and gums* will do its healthful work. After each and every meal, *in the order named*, use a *quill tooth-pick*, *waxed floss silk*, and *rinse with water*. The intention of these is to *remove food from the teeth*. The pick does its work in *open places* and removes the *mass*: the *floss passes between points in contact* and *disturbs the smaller deposits*; water washes the *finer particles* away, and gives *dilution to the acids*.

Dr. Carl Heitzmann. Mr. President: At one of the late meetings of the Pathological Society, Dr. John A. Wyeth, a well-known surgeon in this city, presented a fully-developed molar with the following history: A woman of middle age came to him with a swollen left cheek, and he diagnosed the case as empyema of Highmore's antrum. He extracted a loose tooth, perhaps two of them, from that side, and with a trephine simply opened into the maxillary antrum. Some pus rushed forth, and he discovered a fully-developed molar, loosely attached to the mucous membrane, one of the roots being fully developed, the two others only partially. This case seems so strange and rare that I would like to inquire of you, gentlemen, who have had a more extensive observation in this field than the general surgical practitioner, whether such things do often occur or not. From the stand-point of histological development, of course, we could understand such a formation high up in the antrum; but in practice it seems to be rather an unusual case.

Prof. Frank Abbott. I understand that from the opening that had been made by the extraction of one or two teeth this tooth was thrown out with the discharge of pus?

Dr. Heitzmann. Yes, sir; he extracted the teeth and found a foreign body inside of the antrum, loosely attached to the mucous membrane, and extracted it.

Prof. Abbott. The only explanation, as I understand the case, would be that there was a mal-positioned (perhaps a supernumerary) tooth, held in the alveolar process above the roots of the other teeth; that the abscess formed from the dead tooth or teeth which were extracted by Dr. Wyeth destroyed the alveolus which surrounded it; and when the loose teeth were extracted, this one which then had no support, fell into the opening thus made, and that it did not really form in the antrum itself, and had not been there except it had been pushed in in the operation. I have never seen a case exactly like the one Dr. Heitzmann has described, but I have seen a case of abscess where, in the extraction of a temporary second molar for a child, the crown of a first permanent molar dropped into the opening so made, and fell out. To a casual observer it would appear to have come from the antrum. The crown only was formed, there being no roots at all. In nearly all mal-positioned teeth that I have seen, there is something about the roots abnormal in shape; they are unusually short, crooked, or exostosed, probably in most cases from having impinged upon the roots of the other teeth.

Dr. Heitzmann. I wish to emphasize the fact that, according to Dr. Wyeth, the tooth was entirely inside the antrum,—it was not pushed in. It was evidently developed independently from all the other teeth of the set; for the doctor counted sixteen teeth in the upper jaw.

President Perry. Dr. Kingsley has just placed upon the table two singular-looking instruments; perhaps he will be kind enough to describe their use.

Dr. N. W. Kingsley. I believe housekeepers usually find some one implement that they cannot keep house without. I have two of of them. I made them originally for removing tartar from the lingual surfaces of the lower teeth. They have a straight edge on one side and a curved edge on the other, and they are better adapted for that purpose than anything else I have found. I have also found them to be of equal value in the manipulation of all plastic fillings. With one or the other of these instruments I can reach all the posterior surfaces of the teeth. I find them of almost universal application, within certain limits, not only for the removal of tartar, but in the introduction of plastic fillings. They are made in pairs—right and left, and the blades you will observe, are not bent at right angles with the shaft, but obliquely.

President Perry. They must be useful for trimming off gutta-percha fillings.

Dr. Kingsley. They are.

Prof. C. A. Brackett. I have here a tooth the history of which has been very interesting to me, and it is possible it may interest some of the gentlemen present also. As its history is mostly connected with people who are not now living, I think it will not be doing injustice to anyone to call names. The lady whose tooth this was, was thirty years ago a patient of Dr. Joshua Tucker, in Boston. This was a left lower second or third molar, with a very large corono-buccal cavity. Dr. Tucker, perhaps feeling that it was injudicious to do anything in the way of salvation, gave the patient the impression that it was impossible to do anything. With that impression the patient went to another dentist, old Dr. Bemis, widely and favorably known in New England as a gentleman of skill in his profession, and he, under the stimulus of being told that Dr. Tucker had condemned the tooth, performed for it what you see here. That was some time previous to the introduction of cohesive gold, and the idea was to build up some kind of a filling that should restore the angle and contour of the tooth, and that should retain its place. That was accomplished by accurately fitting a gold hoop about the tooth, packing the cervical portion with gutta-percha, and filling the remaining portion with soft gold. You see here the gutta-percha, the gold, and the hoop as they were originally placed there, some twenty-five years previous to the breaking off ot the crown, which occurred during the past summer. The red gutta-percha I placed there myself one year previous to the failure of the tooth.

President Perry. Do I understand that the gutta-percha has been in position, as seen here, for twenty-four or twenty-five years?

Prof. Brackett. I am quite sure that that statement is substantially correct. It was very closely covered by the cheek and not exposed to friction.

Prof. C. A. Brackett then read the following paper, on "Mistakes and Failures."

Mr. President and gentlemen: Few things that I have been called upon to do have I approached with such diffidence as the appearance before you to-night. This you can perhaps hardly appreciate. I question if the metropolitan members fully realize how we of the rural districts look up to the Odontological Society as the exponent of all that is latest and best in the science and practice of our profession, and how much, either from presence here or from study of the published transactions, we are from month to month learning from your papers and discussions. That I can profitably occupy much of your time seems very unlikely; and I have consented to try more to show my disposition to be helpful than in the hope that anything I can present will be of much service. If my essay is not in itself a marked illustration of its title I shall be gratified.

The subject, "mistakes and failures" was announced some weeks before much of anything else was done in the preparation of the paper. If I may be permitted to modify the subject I will make it mistakes and consequent failures. The whole field of failures is too large to be considered in any detail in this connection to-night.

The esteemed chairman of the executive committee has encouraged me by kindly saying, "The subject is a rare one in its importance, and its discussion ought to do great good, as the mistakes and failures are legion, and if we can get fairly at the cause the remedy can pretty readily be applied generally." This expression is quite in accord with my own feeling; and I have sought to make out something of the causes of mistakes, and to make some deductions therefrom.

At the outset science and a good share of theology bid us set aside the formerly alleged personal embodiment of evil as having any part in the mischief. However badly an artificial denture of our construction may serve its purpose, or whatever our failures may be in manipulating gold, or in combating pathological conditions, we are enjoined from ascribing the responsibility to the devil. Witchcraft also long since ended its brief and circumscribed reign. There remains, however, a depravity both of animate and inanimate things which only can explain a portion of the untoward events that occur.

If we begin to analyze mistakes we see that they admit of being classified, and classified in a number of ways. If we make a classification and study them, little by little we may find that the whole subject is less difficult than it at first appeared. If we make no classification other than such as can be based upon the causes of mistakes we have still room for quite a variety. For instance, we may say by way of analogy to what we are accustomed to say in regard to the etiology of pathology, that the causes of mistakes are predisposing causes and exciting causes, remote causes and proximate causes, intrinsic causes and extrinsic causes. With the metaphysicians we may say that the causes of mistakes are either subjective or objective, and here we should note that when this dividing line is projected, ultimately a large portion of the causes will be found on the subjective side.

> "The fault, dear Brutus, is not in our stars,
> But in ourselves, that we are underlings."

A recent writer maintains that at least certain classes of people of the present day are much more given to subjective thought than people of previous generations were. This appears plausible as an idea and hopeful as a prophecy of consequent progress. When we have intelligently and soberly settled to do all that we possibly can do ourselves to prevent mistakes, a great point has been gained. Having first removed the beam from our own eye we may see more clearly to get the mote from our brother's eye, or possibly we may trust him to do it for himself.

Of the subjective causes of mistakes we may make a great group that all arise from our own ignorance. An eminent deceased member of our profession once argued that the reason why conservative surgery is not attempted or is not successful in every instance is the surgeon's ignorance. The limb that has sustained the most comminuted compound fracture is not saved because the surgeon does not know how to save it; an intestinal intussusception is not relieved because all the means that the physician feels justified in employing fail; apoplexy and fractures of the skull are fatal because the healing art has not yet learned to make them otherwise.

But you say that in most of these cases the conditions are such that it is impossible to save the limb or to save the life, and with the present light that we have you are right; and yet only a few years ago the most capable men said it was impossible to reduce a dislocation of the hip without the application of immense force; impossible to prevent hospital gangrene; impossible to crush and safely remove through the natural passage in a single brief sitting a large vesical calculus; impossible to account for the spread of typhoid;

impossible to spell out communications through a cable lying in the depths of the sea; impossible that one man could whisper in the ear of another a hundred miles away. Within the memory of men who still call themselves young, a scientist gave in Boston a public lecture demonstrating the absolute physical impossibility of propelling a boat by the power of steam alone across such a stretch of water as that from Sandy Hook to Queenstown.

Dentists have said, an amalgam filling which will not shrink cannot be made; a prominently convex corner of a tooth cannot be built up with gold; there is no means by which a cavity in a lower tooth in a very wet mouth can be kept absolutely dry for more than a very limited time; if in a given case nature has failed to provide a *velum palati* art can do nothing practical to supply the deficiency; a tooth affected with acute alveolar abscess cannot be directly treated (as a palliative you may apply poultices to the face until the tooth is fit to be extracted, but you must not extract it till all the acute symptoms of pain and swelling and soreness have subsided); an exposed pulp of a tooth cannot be painlessly covered with any substance artificially applied that will be tolerated with perfect comfort, that will permit the maintenance of the vitality of the tooth in its entirety, and so favor nature's reparative process that if the filling be removed in a year the perforation will be found completely bridged over with the material of repair.

These are specimens of many prominent points in theory and practice which have been incontestably demonstrated to have been mistakes of ignorance. In the advance of knowledge we have learned better.

At the present day, while we have still many mistaken conceptions of this kind to correct, and deplorable as many of their consequences may be, it is probably true that in the aggregate far greater mischief is done by the mass of the profession not keeping abreast of the times; not making themselves recipients of the light which is shining; not knowing what they ought to know, what it is their duty to know, what they could hardly fail to know if they possessed the right spirit and the right energy.

We may make from the subjective mistakes another large group and call them the mistakes of incapacity, of inadaptedness, of inaptness. As a rule it is undeniably true that men who are not universally and omnipotently lazy like to do what they can do, and they have most satisfaction and pleasure in doing what they can do best; so that when a man says, "I don't like my business," or, "I hate such and such parts of my work," it is liable to be nearly equivalent to saying, "I do not easily attain marked success in doing those things." But in civilized communities so many and so strong influences, outside of a man's natural predilections, are brought to bear upon him that a very material proportion of men are not doing what they can do best. The ambition of parents, the influence of friends, the Mrs. Grundy of respectability, the struggle for sinecures, the scheming to gather dollars in some easier way than by squarely earning them, are some of the magnets which pull men away from the course which they would more naturally and often more profitably pursue. A man who is not fitted even to be a wood-sawyer because he does not possess the peculiar kind of capacity needed for cutting the sticks off squarely bungles as a surgeon; a man who might be a good farmer becomes a fourth-rate minister; an efficient railroad conductor and an expert type-setter are lost to the world that two more men may starve as alleged lawyers. This grand mistake in choosing the calling foreordains such a constant succession of mistakes in the prosecution of the calling that to attempt even the naming of examples would be idle.

We may group together all other mistakes as having for their causes what in a word we may call disturbing influences; for if a man knows how to do a thing, and is capable of doing it, and yet fails in its accomplishment, it necessarily follows that the failure must be ascribed to some adventitious circumstance or circumstances. These may be either subjective or objective—that is, they may come from within himself or from some outside source. The effect even of those which come from outside depends largely upon subjective conditions, just as the physical effect of exposure to deleterious or contagious influences depends largely upon the amount of what we call the resistive capacity of the individual.

As instances of some of the causes in this group we may name any- and everything that detracts from the best physical state, and the best mental balance and acumen, such as want of proper nourishment, lack of ample sleep, failure to obtain proper intervals of rest, change and recuperation, overwork, weariness, exhaustion, the undue indulgence of appetite or passion, emotional prodigality, carelessness, inattention, embarrassment, lack of self-control, haste, trying to do in an hour what can be properly done only in an hour and a half, outside pressure and demands, calls to be in two or three places or to do several things at once, some source of dissatisfaction with ourselves, with those with whom we have to do, or with some of our surroundings,—everything in the way of disturbing influences, which may be different for different individuals, as noise, untidiness, uncomfortable temperature, absence of accustomed stimuli, etc., etc.

The lady who said she liked to go into company well dressed because she could appear better, expressed a great truth even though she might not have reasoned out how the consciousness that her material appearance was above criticism, or was commanding admiration, greatly favored her self-possession and the control of her conversational powers. Put a bright intellect in a company and impress it with an overbearing suggestion of its inferiority, and what will you get from it in the way of the expression of wit or sense?

In the same way the quality of our work as dentists is to a degree modified by the people for whom we work and by the light in which they regard us. We all of us have patients for whom we realize in advance that we shall be incapable of accomplishing our highest ideals; we have others for whom we can easily do anything whatever.

What we are able to do is greatly influenced by want of proper self-valuation. When this is too small it corresponds to another's faint praise, whose damaging effect long since passed into a proverb; when it is too large it may be the cause of the most grievous mistakes, and constitute that pride which goeth before destruction.

The effect of these disturbing influences is proved by the different appearance which the same thing has to us at different times. A skilled sanitary engineer, reconstructing the drainage of a house, one afternoon in a fit of hypochondria maintained that it was impossible to carry a pipe in a certain very desirable way, and left the work in despair. The next morning he not only saw how to do it, but he could have done it if the circumstances had been only one-half as favorable.

Under the influence of haste instruments are broken, frail enamel is chipped, cavities are overlooked, pathological conditions pass unrecognized, disease is not correctly diagnosed or judiciously treated, and patients are subjected to unnecessary discomfort, pain, and damage. The absent, preoccupied, perplexed, harassed mind is not able to know what would be at once apparent to the calm, concentrated, attentive one. Wearied nerves and muscles cannot accomplish at its best work which requires the utmost delicacy, precision and coördination of movement.

It is a practical reflection that in these disturbing influences of one kind and another may be found the explanation of many of our common mistakes, short-comings, and failures. True, we are not all alike susceptible to them; but if the house next door was burning down, few of us would be able to successfully accomplish during its destruction an operation requiring the utmost skill, steadiness, deliberation, and concentration; and the difference between the effect upon us of such a conflagration and the effect upon us of the little harassing annoyances and distractions is only one of degree.

We should distinguish carefully between a failure which is the result of some fault on our part, and a failure which is due to some extraneous, rare, or peculiar circumstance. If you offer your morning paper to your fellow-traveler in the cars, and it is gruffly declined, it does not follow that it is a mistake to be courteous and obliging and to seek to confer pleasure upon those around us. Because a Gardiner dies of septicemia is not sufficient reason for giving up the conservative treatment of teeth affected with alveolar abscess.

What can be done to prevent mistakes? In a word, let us say, avoid the things that lead to them. Make the most of knowledge and reflection and retrospection in regard to them. At the close of each day a few minutes cannot be spent more profitably than in reviewing its events, and in considering how many of them that were within our own control we could have made better. Then let us strive to put the knowledge thus gained from day to day into constant practice. It will pay.

A practical suggestion concerning the avoidance of mistakes in matters which are difficult of decision, in instances in which there is conflicting testimony or opposing arguments, is to try to view the matter from both stand-points. Being disposed to favor a particular decision, dismiss the case for the time and afterward take it up in the capacity of the defendant's attorney and see what reasons you can advance. Following this practice has been a material element in the success of many eminent men.

Will mistakes ever cease? No; while the world stands they will have place. The time will never come in which it will not be as true to say that no man lives without making mistakes as it is to say that no man liveth and sinneth not. Certain kinds of mistakes have been set aside. Men no longer cling to the idea that the earth is flat, and that the sun in some mysterious way goes round it. Intelligent men long since gave up the effort to invent perpetual motion in any form; and so the advance of science and the progress ot the world will dissipate many delusions which we are cherishing today, and they who come after us will be warned of the traps into which we have fallen.

There are ways in which mistakes are beneficent, and we ought not to say all that is bad concerning them without giving them credit for elements of good which they contain. Over and over and over again attempts which have been made to do or accomplish or invent or discover a certain thing have, so far as that particular thing was concerned, failed utterly, but they served to reveal and develop something else perhaps many times more valuable than the object sought. Many of the world's greatest truths and most important inventions have been blundered upon.

Again, a succession of mistakes may contribute quite as much as a series of successes to make a man in the highest degree wise and capable and eminent. In a given case it may be as important to know what not to do as it is to know what to do; and accumulated experience and skill in learning and applying the lessons to be gained from that experience are what make the difference between such a man as J. Marion Sims and the recently graduated fledgeling from the medical school.

The great moral of all this is that when we have made what have proved to be mistakes we should profit by them and turn them to as good an account as possible. The spirit which does not take no for an answer, which in practice does not acknowledge itself beaten, which makes untoward circumstances propitious, which organizes victory out of defeat, is the spirit which has energized the men whom the world remembers.

Discussion.

Dr. Dodge. I take pleasure in pronouncing the paper a very able one, and in the highest degree interesting and instructive. If I were to signify one point in it that has gratified me most, and where I think the wisdom is most conspicuous, it would be be the statement that our blunders are not due to the devil, but to ourselves. My interest in this statement is not purely nor mostly theological. I think the devil, if there is one, will be able to take care of himself; and if we take care of ourselves, I don't think he will trouble us much. To be a little more serious, one of the best acquisitions of growing experience that I have found, in my dental practice, is that most of the difficulties which at the first blush seem to be in the material, or in the instruments, or in the intractable patient, or a dark day, or whatever else we may be inclined to substitute for the devil,—most of these difficulties can be removed by turning our attention within. I have found that just going into another room and sitting down for a few minutes and cool, ing off, would make the patient in my chair a much more docile and tractable individual. In some such way the total depravity of inanimate objects, that makes the gold roll out of the corner you put it in, or the particular instrument you want hide under two or three others that you don't want, is often overcome by getting yourself into a little better mood. Light and trifling things do not easily annoy a man when he is in sound mental condition; and when he finds, on taking an observation, that everything is going wrong, it is an indication that he himself is somehow wrong. The other things will put themselves in place and their peculiar obstinacy will be abandoned as soon as we get ourselves all right.

Dr. Kingsley. I want to congratulate you all, and Dr. Brackett as well, on the paper we have had the pleasure of listening to this evening. I mean no disrespect to anyone present when I say that there are but few men in our profession who are capable of writing such an essay. It is philosophical and scholarly, evincing profound thought and a clear and full comprehension of his subject, and expressed in language at once choice and forcible.

Dr. Jno. B. Rich. The paper just read embraces the whole range of its title, and treats the subject so thoroughly that there is nothing left to be said. The profound attention with which it has been listened to is the highest commendation we can bestow upon it, and the greatest compliment we can pay Dr. Brackett.

Dr. Atkinson. How shall we get the inspiration to follow the truth when it is revealed to us? how recognize it as truth? As has been said very wisely, and as every man with a religious experience knows, the getting away from himself sometimes affords a man an illumination that this scientific age clouds. What we are doing every day has been regarded as not fit to be spoken of, and the sacredness of our calling has been ignored; it has been materialized and minified; and that is the reason why I feel that we oftentimes speak and work better than we know, by reason of the inspiration of our necessities, that bring us into such relations as convince us of the lack of knowledge. Being great investigators, as every good man must be, we desire the truth for ourselves, but forget utterly that others need the truth as much we do, and that if we have found a way of avoiding mistakes our highest duty is to communicate it to others.

I looked at that piece of work from the hands of Dr. Bemis, and the truth that apppeared to me to be revealed in that was this, that we are all in the same boat, and that if we were really in earnest to do the work that is set before us, and would listen to the voice of inspiration instead of relying wholly upon our little infantile efforts, the truth would be revealed to us; and we would do, as probably Dr. Bemis did then, work quite beyond our present apprehension. There is a volume of instruction to me in that little specimen, and I wish I were always able to communicate with clearness the revelation of truth to my consciousness when I have been relieved from the dread of coming before the sharp minds that were named in the beginning of Dr. Brackett's paper. I think that if we can get these brilliantly ambitious young men more thoroughly awakened among us, and teach them to forget the commercial and financial aspect and give their minds rather to acquiring the knowledge and ability to execute good work, we will have laid the foundation of good patients, good gold, nice instruments, and happy circumstances throughout our every-day work.

Dr. J. Morgan Howe. I have been very much interested, and my vision of the causes of failure has been very much enlarged by Dr. Brackett's paper this evening. I congratulate myself, and you all, upon his effort. I was particularly struck by his reference to the matter of haste. It seems to me that there are two aspects of professional life that press upon us more or less hardly—the pecuniary and the strictly professional. Every one of us takes more or less pride in the work we have in hand; more or less desire controls us to do as well as possible that which we have to do; but, because of the pecuniary consideration that presses upon all, and especially upon those located in large cities where the clamor of riches surrounds us, and the haste to make ourselves rich more or less controls us, the matter of haste to get through has very much to do, I am satisfied, with a large number of our failures to accomplish that which we should set out to do.

Dr. Carl Heitzmann. I am sure that the development and present perfection of American dentistry are largely due to the patient reresearches of individual ingenuity, and to the societies and other means of communicating the results of their investigations to the whole profession. And here I cannot help alluding to a point which is personal. I had the pleasure of introducing in this country a new doctrine regarding the construction of the animal body. I had the pleasure of delivering a lecture, two years ago, before this society, upon the structure of the teeth, in accordance with the new doctrine alluded to. These new points of view were for ten years confined to a very limited number of men who saw their value and adopted them. Yet I must confess that I was supported with great liberality in this country; although not sustained by any scientist abroad for six years, nevertheless, a great many gentlemen here, especially in the dental profession, looked at the points I taught, found them correct, and in this way gradually developed the doctrine which we, with some pride, call American biology. I have been in Europe for six months, and one of the chief objects of my sojourn in Germany was to sound the views of scientists abroad, and in part to ascertain what was coming of the new doctrine; and I must say, gentlemen, that especially in Vienna, I found much gratifying testimony in favor of the American biology. The best scientists, including Prof. Stricker, of Vienna, and his assistant, Prof. Spina, acknowledged as correct everything I maintained in 1872 and 1873, in such a way that but very little is left for them yet to acknowledge.

Dr. Benj. Lord. The paper that we have had the pleasure of listening to is certainly worthy of all the commendation it has received from those who have spoken of its merits. I think that not the least of the many good points in the paper is that it says that mistakes are not wholly evil, that they have a beneficent side as well, and that good may be gotten out of them. This is no doubt the experience of all who are ever trying to do their best to arrive at the greatest excellence and so make the most of life.

Dr. Littig. I cannot altogether agree with some points in the paper. Dr. Brackett said that when we hear a man say he does not like any particular thing about dentistry we may know he is not a success. Now, although you often hear young dentists say, "O, how I like to take out teeth!" when they grow older you generally hear them say, "I do dislike to extract teeth." It is the general experience that as we grow older we want to discard our youthful eagerness to extract teeth.

Prof. Brackett. I said, in that connection, that we could do something better than take out teeth.

Dr. Brockway. There is little left for me to add to what has already been said, but I do not like to let the occasion pass without expressing the satisfaction with which I have listened to the admirable and inspiring paper just read.

On motion of Dr. Bronson the society accorded a vote of thanks to Prof. Brackett for his very able and acceptable paper.

Prof. Brackett. I am sure if there is any feeling of thankfulness to be expressed,it is on my part, for the patience and kindliness with which you have listened to my maiden effort before this society.

Adjourned.

ST. LOUIS DENTAL SOCIETY.

The following have been elected officers of the St. Louis Dental Society for 1884: J. B. Newby, president; N. C. Stark, vice-president; J. W. Whipple, recording secretary; A. J. Prosser, corresponding secretary; G. A. Bowman, treasurer.

James W. Whipple, *Recording Secretary*,
No. 1502 Olive St., St. Louis, Mo.

MINNESOTA STATE DENTAL ASSOCIATION.

At a meeting held at Minneapolis, Minn., Jan. 16, 1884, the Minnesota State Dental Association was organized. The following officers were elected: H. M. Reid, president; L. W. Lyon, vice-president; H. L. Cruttenden, recording secretary; T. E. Weeks, corresponding secretary; S. T. Clements, treasurer; C. H. Goodrich, J. L. Jacobs, C. M. Bailey, A. T. Smith, J. B. Little, executive committee.

The next meeting of the Association will be held July 16, 1884, at St. Paul, Minn.

H. L. Cruttenden, *Secretary*, Northfield.

EDITORIAL.

TEMPERAMENT IN RELATION TO THE TEETH.

The animal creation is divided into kingdoms, sub-kingdoms, classes, orders, families, genera, species. A further or sub-division includes in minor groups individuals whose salient characteristics are correspondent or similar. Thus every living creature has certain physical peculiarities by which its position in this classification is determined. Man, as the head of the animal kingdom, besides having his place in this general scale, is distinguished by a still finer classification under the denomination of temperament,—an association of several distinguishing characteristics, such as size and form of body, complexion, color of the eyes and hair, and to a certain extent the disposition and character of the individual.

Temperament may be defined as a constitutional organization, depending primarily upon heredity,—national or ancestral,—and consisting chiefly in a certain relative proportion of the mechanical, nutritive, and nervous systems, and the relative energy of the various functions of the body,—the reciprocal action of the digestive, respiratory, circulatory, and nervous systems. The stomach, liver, lungs, heart, and brain,—digestion, assimilation, respiration, circulation, and innervation—are all factors in the differentiation of temperament; and according to the congenital predominance of one or the other, and the relative activity of these functions, is the modification of the characteristics of the individual which assigns him to one or other of the basal or mixed temperaments. Each temperament is the result as well as the indication of the preponderance of one or another of these systems, and of relative functional activity.

A perfect equilibrium of the different systems is rarely if ever presented in any individual. One having a balance of all the temperaments would be temperamentless, or of no special temperament. It is difficult, in some cases, to decide positively to which variety a special case belongs, the several temperaments being combined and blended in such ever-varying proportions. Not infrequently the indications are even contradictory, and the blending of several temperaments requires a nice discrimination to define the admixture. The primary elements of temperament are susceptible of such manifold combinations; the determining forces are so complex, and our knowledge of their comparative values is so limited, that no rule can be given which will not fail in numerous instances to apply in all respects to individual cases; but that there is a general relation between constitutional qualities and external signs does not admit of question.

Temperaments are readily divisible into four basal classes—bilious, sanguineous, nervous, and lymphatic; then again into subclasses of mixed temperaments—a combination of two or more of the primary divisions. In these combinations one or other of the so-called basal temperaments predominates, and a compound term is used to express the complexity, as for instance the nervo-bilious, signifying that the bilious base—the foundation temperament—is qualified by an admixture of the nervous element, and so throughout the series. Twelve varieties of temperament, in addition to the four basal, may thus be designated by the combination in pairs of the original four. The admixture of the peculiarities of three or of all four of the basal temperaments results in what are denominated respectively ternary and quaternary combinations, which call for nice discrimination in diagnosis; but even such complexities are registered in the size, form, and color of the dental organs.

The value of a practical application of the study of temperament in the practice of dentistry is apparent. That the relation of the teeth to temperament is as a rule ignored by those engaged in prosthetic dentistry is evident in the mouths of a majority of those who are so unfortunate as to be under the necessity of wearing substitutes for lost natural dentures.

A certain law of harmony in nature between the teeth and other physical characteristics necessitates respect to size, shape, color, and other qualities in an artificial denture, in order that it shall correspond with other indications of temperament; and if teeth correlated in their characteristics to those which nature assigns to one temperament be inserted in the mouth of one whose physical organization demands a different type, the effect is abhorrent. The artificiality of artificial teeth is the subject of remark by those who have little or no conception of the reason therefor,—simply an instinctive appreciation of the incongruity and unreality. It is indeed rare to see a case in which there is occasion for a moment's hesitation as to the fact of replacement. There is no dental service that from the esthetic stand-point is as a rule so ill performed as the prosthetic. Thousands of dentures are constructed which serve the needs of the wearer for speech and mastication, but which are nevertheless deserving of utter condemnation as art-productions. More attention has been paid to the best methods of restoring impaired function—securing comfort and usefulness in artificial dentures—than to a correlation of the substitutes to the physical characteristics of the patient.

What is needed is such an appreciation of the law of correspondence that the dentist can cipher out, as by the rule of three, the character of teeth required in the case of an edentulous mouth, with the same precision as the comparative anatomist can from a single bone indicate the anatomical structure of the animal to which it belonged.

The probability is that in many, perhaps in most, of the cases of incongruous artificial dentures the fault is not in carelessness or indifference of the dentist, but in a failure to recognize the requirements of temperament. A certain family resemblance to each other in a set of teeth is considered essential, but the adaptability of the set as a whole to a given case should be esteemed of even greater importance. Especially is there a notable failure to recognize the color demanded by form. A set of teeth in which not only the relative length and breadth but every line and curve characterize it as belonging to a certain temperament is, in contravention of every law of correspondence, made of a color which was never found in nature associated with such forms. Thus we see constantly such incongruities as the association of the massive tooth of the bilious temperament with the pearl-blue color belonging to the nervous temperament, and the long, narrow teeth of the nervous temperament of the bronze-yellow color never seen in the mouths of any but those of a bilious temperament.

The trouble is not with the manufacturers; they supply the demand. The fact is, the requirements of the law of correspondence have not been sufficiently studied by the profession. The first study of the dentist who aspires to the dignity of artist, when proposing to replace a lost denture, should be how to restore the natural appearance of his patient, and this can only be effected through an appreciation and observance of the temperamental characteristics and the law of correspondence or harmony. Age and sex may somewhat modify the requirements in a given case, but the basal fact on which he should proceed is temperament. A failure to recognize its demands will result in failure,—from an esthetic stand-point. A knowledge of the distinguishing characteristics of the various temperaments and the style of teeth which conforms to nature's type in the physical organization marks the difference between the dental mechanic and the dental artist.

The subject has been but little discussed and deserves to be better understood. We are glad, therefore, of the permission of the publishers, Henry C. Lea's Son & Co., to present the two following tables of the basal temperaments and the indications thereof in the teeth, from matter prepared by Dr. E. M. Flagg, Lecturer on Dental Art at the Pennsylvania College of Dental Surgery, for "The Scheme of American Dentistry," now in preparation for publication.

Dr. J. Foster Flagg, Professor of Dental Pathology and Therapeutics in the Philadelphia Dental College, has written much valuable matter on temperaments in their relation to dental pathology. The tabular presentation of the dual temperaments and their relation to the teeth, is condensed chiefly from his series of articles on "Dental Pathology," published in the DENTAL COSMOS.

THE FOUR BASAL TEMPERAMENTS AND THEIR GENERAL INDICATIONS.

	INDICATIONS.	BILIOUS.	SANGUINEOUS.	NERVOUS.	LYMPHATIC.
1	General Form or Framework . .	Tall, angular, massive; square-built.	Full, firmly-rounded contour development; medium height; robust.	Delicate; slight, but erect and well-proportioned.	Bulky; heavy; clumsy.
2	General Movement	Steady and persistent.	Full, graceful, and easy.	Rapid but fitful in movements; quick in the sense of frequent.	Unsteady; uncertain; loose-jointed; sluggish; deliberate.
3	Muscular Development	Knotty; prominent; hard; tense; well-developed.	Well-rounded and graceful.	Well-defined; light, but sinewy.	Large, but flabby and ill-defined.
4	Chest or Thorax	Square and capacious; good expansive power.	Well-rounded and capacious; deep and full.	Not broad but prominent; very expansive.	Large, but lacking in expansive power.
5	Voice, Quality of	Strong, but inclined to harshness.	Smooth; sonorous; full.	Not very strong, but clear, penetrating, and ringing.	Poor in vibration, but often soothing and quieting in quality.
6	Complexion and Skin	Brownish-yellow; tense, and inclined to roughness; dry.	Florid; smooth; warm and dry.	Abounding in grayish tints; fine in texture, and elastic.	Pallid; muddy; moist and cold.
7	Favorable Endowments or Advantageous Indications	Strength; endurance; fortitude; decision; firmness.	Hopeful; enthusiastic; aspiring.	Remarkable recuperative power	Gift of self-control; calm; cool; quiet.
8	Unfavorable Endowments or Disadvantageous Indications . .	Inclined to melancholy; despondent.	Lack of self-control; impetuous.	Mental fitfulness, and inclined to rapid degeneration or retrogression.	Inertia; low recuperative power in pathological conditions.
9	Cranial Contour	Square forehead and cranium.	Rounding and full forehead and cranium.	Cranium inclined to preponderate over face.	Forehead low and not shapely; often receding and flat.
10	Facial Contour	Angular; high cheek-bones.	Round and full.	Delicately oval.	Flat-faced.
11	Hair	Black, and closely curling; inclined to coarse.	Golden to light chestnut; slightly wavy.	Brown; wavy; fine.	Coarse; straight; drab, and sparse.
12	Eyes	Average size; black, and strong in expression.	Large; full; clear; round; blue.	Above average in size; dark-brown; perceptive in expression.	Small, expressionless, and grayish.
13	Eyebrows	Heavy; strong, and straightly marked.	Fairly arched; not well-marked.	Well-marked and arched; finely pencilled.	Sparse and indistinct.
14	Nose	Strong in outline; Roman.	Straight and shapely.	Finely cut and often delicately aquiline in form.	Flat; alæ heavy.
15	Lips	Large, and brownish-purple.	Ruddy and full.	Fine and grayish-pink.	Large, but not shapely, and pale.

THE TEETH AS INDICATED BY TEMPERAMENT.

GENERAL DIVISIONS.	BILIOUS.	SANGUINEOUS.	NERVOUS.	LYMPHATIC.
General Color and Quality of Color . . .	Bronze-yellow, with strength or power of coloring.	Cream-yellow, and inclined to translucency.	Pearl-blue or gray; inclined to transparency.	Pallid and opaque, or muddy in coloring.
General Form	Large and inclined to angular; rather long in proportion to breadth.	Well-proportioned; abounding in curved or rounded outlines; cusps rounding.	Length predominating over breadth; fine, long cutting edges and cusps.	Large, but not shapely; breadth predominating over length; cusps poorly defined.
Surfaces of the Teeth .	Inclined to transverse ridges and abounding in strong lines; neither brilliancy nor transparency of surface, but slight translucency.	Smooth, or nearly so; elevations and depressions rounded; cutting edges and cusps translucent. Fair degree of brilliancy.	Brilliant and transparent depressions and elevations; abounding in long curves.	Surfaces of incisors devoid of depressions or elevations; opaque and dead in finish, even to cutting edges.
Articulation	Firm and close; well-locked.	Moderately firm; jaw inclined to rotate in mastication.	Very long and penetrating.	Loose and flat.
Gum Margin or Festoon	Heavy and firm, but inclined to angularity.	Round and full, as regards both breadth and depth.	Delicate, shapely, and fine; oval in curve.	Thick and undefined in shape.
Rugæ	Heavy and rugged in shape; squarely set.	Numerous and graceful in outline; not heavy, but well rounded.	Close, not numerous; small and long.	Sparse and flat.

THE DUAL OR BINARY TEMPERAMENTS AND THEIR INDICATIONS.

INDICATIONS.	SANGUO-BILIOUS.	NERVO-BILIOUS.	LYMPHATICO-BILIOUS.	BILIO-SANGUINE.
Size and General Form.	More than average size; tendency toward irregularity, rather than rotundity of form in male and female.	Whether tall or short, of average size; average osseous, muscular, and contour development.	Decidedly more than average size.	More than average size; not particularly height, but breadth of shoulders, fullness of chest, well-rounded muscularity in the male, and rounded development in the female.
Complexion and Skin.	Fairly smooth; but little color; dark and yellowish in its tinting.	Inclined to dark.	Dark-colored; not smooth, and with tendency towards ephelides, chloasma, moles, etc.	Smooth, soft, and creamy tinted; glowing.
Cranial and Facial Contour	Cheeks broad; forehead square, good size; jaws large, angular, and strong; chin square and large.	High cheek-bones; forehead large; jaws small; chin small.	Cheeks average; forehead average; jaws average; chin average.	Cheeks round; forehead large; jaws large and well-formed; chin large and round.
Hair	Black, or nearly so; coarse and curly, but usually not luxuriant in quantity; beard is universal rather than handsomely set; eye-brows decided, but usually more straight than arched.	Dark, and usually decidedly curly; of average quantity and quality; beard sparse and unequally planted; eyebrows decidedly marked, but not decidedly arched.	Very dark and wavy, and inclined to coarse; beard full and wavy; eyebrows marked and heavy.	Very dark, but not black; more than wavy, but not shortly curly; luxuriant in quantity, and fine in quality; beard full and well-planted; eyebrows decided in their marking and arching.
Eyes	Very dark or black, and strong rather than lustrous in expression.	Very dark brown; average size, but with much perceptive expression.	Dark and usually strong.	Dark, large, lustrous, and expressive.
Mouth and Lips . . .	Mouth moderately large; lips average in size; inclined to large, and of a brownish-red.	Mouth average size; lips thin and shapely.	Mouth large; lips usually firmly set, and brownish in color.	Mouth moderately large; lips full and red.
Nose	Large and decided in contour.	Usually very shapely, with slight or decided tendency toward aquiline.	Large, with breadth.	Shapely.
Color and Structure of Teeth	Dark yellow; good quality; usually very strong.	A combination of yellowish and bluish colors; enamel good; dentine soft.	Yellowish in color; enamel of fair structure and polish; dentine fair.	Rich, dark cream color; excellent in quality.
Size and Form of Teeth.	Large; flat-arched; strong edges; strong, large cusps.	Long and narrow, with long cusps.	Large, thick edges; short, thick cusps; flat-arched.	Average size; round-arched; nicely developed cusps and edges.

THE DUAL OR BINARY TEMPERAMENTS AND THEIR INDICATIONS.—CONTINUED.

INDICATIONS.	NERVO-SANGUINE.	LYMPHATICO SANGUINE.	BILIO-NERVOUS.	SANGUO-NERVOUS.
Size and General Form.	More than average size; well-built; marked depth of chest, and breadth of shoulders.	More than average size; fair but not marked physical development.	Less than average size; decidedly less than average osseous, muscular, and contour development.	Less than average size; decidedly less than average osseous, muscular, and contour development.
Complexion and Skin.	Fair and finely florid.	Very smooth and soft; pinkish and even inclined to florid,—sometimes freckled.	Dark and inclined to freckle.	Fair and smooth, with fine color tints.
Cranial and Facial Contour	Cheeks full; forehead good; jaws average, full, and round; chin average and round.	Cheeks round and slightly full; forehead average; jaws large and full.	Cheeks high-boned and prominent; lower part of face inclined to thin; chin small and round.	Forehead high, full, and broad in proportion to the rest of the face; cheeks high and prominent; lower face inclined to thin; chin small and round.
Hair	Sandy to red; full in quantity and fair in quality; beard sandy to red, and wavy; eye-brows light and arched.	Light chestnut; decidedly inclined to curl; beard generally well-planted but not heavy; eye-brows dark chestnut and moderately arched.	Of the peculiar range from dark brown (almost black) to dark red (varnished mahogany); beard sometimes heavy, sometimes scanty, ranging in color like the hair; eye-brows either decidedly arched or almost straight, but usually marked.	Light and curly; of fine quality, with decided inclination to baldness; beard scanty, but pleasing both in quality and length; eye-brows light and arched.
Eyes	Light hazel to clear blue; usually larger than average.	Gray-blue and expressive.	Less than average size; in color from hazel or lighter to dark brown or almost black.	Blue or gray; full; inclined to large, and expressive.
Mouth and Lips . .	Mouth average size but with a fullness of lip which gives it an appearance of more than average; lips full and red.	Mouth medium and oftentimes beautifully shaped; lips dark pink.	Mouth average size; lips may be either thin or full.	Mouth average or small; lips full.
Nose	Usually shapely and inclined to large.	Usually very shapely.	Generally thin, and either prominent at the bridge or pointed and somewhat upturned.	Thin, prominent, and shapely.
Color and Structure of Teeth	Rich cream color; enamel and dentine of excellent structure.	Grayish cream; enamel fair; dentine fair.	Generally bluish; enamel fair; dentine soft and sensitive.	Bluish cream color; enamel good; dentine usually sensitive, sometimes exquisitely so.
Size and Form of Teeth	Average size, handsome shape, rounded arch, good and shapely edges and cusps.	More than average size; shapely edges and cusps; rounded arch.	Variable in size and form; in one patient broad, and in another long, with narrow necks and long cusps.	Average size; shapely; inclined to length, and with narrowish necks.

THE DUAL OR BINARY TEMPERAMENTS AND THEIR INDICATIONS.—CONCLUDED.

INDICATIONS.	LYMPHATICO-NERVOUS.	BILIO-LYMPHATIC.	SANGUO-LYMPHATIC.	NERVO-LYMPHATIC.
Size and General Form.	Average size; less than average osseous and muscular, but more than average contour development.	Decidedly more than average size, but with largeness of development neither beauty of form nor strength of structure.	More than average size; full, round development.	Average size; average development.
Complexion and Skin.	Dark or light, but generally devoid of freshness and color.	Dark, pallid, and opaque.	Soft and smooth; color ranging from ivory whiteness to light pink, and handsomely tinted.	Light; pallid; deficient in quality.
Cranial and Facial Contour	Cheeks inclined to full; prominent; rounded; forehead broad and high; jaws average; chin small, well formed.	Cheeks large, but not prominent; forehead large but inexpressive; jaws large and rounded; chin large and round.	Cheeks large and full; forehead broad and moderately high; jaws full and round; chin large and round.	Cheeks full and somewhat prominent; forehead good, and usually high; jaws average; chin average; round.
Hair	Medium in color, but straight, or at most slightly wavy; beard sometimes almost wanting; eyebrows not marked nor arched.	Dark, moist, and straight; generally in good quantity, but lacking in quality; beard moderately heavy, dark, and straight; eyebrows marked.	Dark to light chestnut; straight or wavy; of average quantity; sometimes luxuriant, and of good quality; beard not heavy; brown and soft; eyebrows light or dark, but not decidedly arched.	Straight and medium in color; beard straight and medium in quantity and quality; eyebrows marked and arched.
Eyes	From dark gray to light gray (modifications of this temperament sometimes produce apparent anomalies, as dark hair with very light eyes, or light flaxen hair with black eyes).	Dark gray to quite dark; moderately large, but wanting in expression and power.	Light, large, and mildly hopeful in expression.	Medium size; grayish, inclining either to green or hazel.
Mouth and Lips . . .	Mouth average or small; lips fairly full.	Mouth large; lips full and bluish or brownish-pink in color.	Mouth large; lips full.	Mouth average; lips usually shapely.
Nose	Average; somewhat decided in contour.	Large, full, and broad.	Shapely.	Average; not decided in contour.
Color and Structure of Teeth	Grayish-blue; soft, and frequently quite sensitive.	Yellowish in color; of good polish, but of suspicious opacity.	Creamy-gray; enamel fair, not strong; dentine fair.	Bluish-gray; soft, and somewhat sensitive.
Size and form of Teeth.	Average, or less than average size; shapely, with rounded arch.	Usually large; thick edges; short, thick cusps; flat-arched.	More than average size; broad, round-arched.	Average size; good shape; neither long nor short; with rounded arch.

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ELEMENTS OF HUMAN PHYSIOLOGY. By HENRY POWER, M.B., Lond., F.R.C.S., etc. Illustrated with forty-seven engravings. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, $1.50.

This book is good, so far as it goes, but the author—whose wide knowledge of the subject is undoubted—has been led to omit so many interesting points, on account of the almost simultaneous publication of other works in the same series, that it lacks completeness. He omits all details of structure and refers to Klein's "Elements of Histology;" he omits physiological chemistry, on account of Dr. Ralfe's work; and to avoid entering the domain of Dr. Robertson and Professor Bell, who have written on physical physiology and comparative physiology, he has not included any description of instruments or methods of physiological work, and has left out most of the usual references to animal physiology. The book, as we have said, remains a good one, but should be used, if thoroughness in this branch is aimed at, only in conjunction with the four books above mentioned. We are old-fashioned enough still to prefer Dalton, or Kirke, or Foster, in any one of which the entire subject is treated with quite sufficient fullness for the student, while Flint amply covers the entire ground if a more special knowledge is sought for.

CLINICAL CHEMISTRY. An Account of the Analysis of Blood, Urine, Morbid Products, etc., with an Explanation of some of the Chemical Changes that occur in the Body in Disease. By CHARLES HENRY RALFE, M.A., M.D. Cantab., F.R.C.P., London, etc. Illustrated with sixteen engravings. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, $1.50.

Dr. Ralfe's name has been so long and so favorably known in connection with medical and physiological chemistry that it is in itself assurance that this little work—one of the series of Students' Manuals—is accurate and reliable. It is written, as the author announces in the preface, with the intention of furnishing to both student and practitioner a concise account of the best methods of examining chemically abnormal blood, urine, morbid products, etc., at the bedside or in the hospital laboratory. It has many merits and contains an astonishing amount of information condensed into very small compass; but we doubt if it will be of service to many general practitioners, or to other than very advanced students. Most of the directions given for the determination of changes in the blood or secretions require for their practical application a degree of familiarity with the details and manipulations of the laboratory that the practicing physician has not time to acquire, and that even the third- or fourth-year student of the present day is apt to find beyond his capabilities. In most of the medical schools of late years the teaching of medical chemistry has tended to run to extremes. Elaborate reactions are explained and a knowledge of them is required at examination. Complicated tests for sugar, for albumen, for the various toxic drugs are taught, and a vast amount of time is spent over them in the laboratory. After graduation not one physician in a hundred ever applies the knowledge so laboriously acquired and which therefore soon escapes him. If the work before us had been simpler it would have been a more valuable addition to a "Student's Series."

THE DISSECTOR'S MANUAL. By W. BRUCE-CLARKE, M.A., M.B., F.R.C.S., and CHARLES BARRETT LOCKWOOD, F.R.C.S. Illustrated with forty-nine engravings. Philadelphia: Henry C. Lea's Son & Co., 1883. Price, $1.50.

The needs of the student have been carefully and conscientiously kept in mind in the preparation of this excellent little work, the only marked defect in which is the paucity of illustration. The descriptions of structures, of their relations to one another, and of the manner of removing or separating them in a systematic dissection are admirable, and are couched in language at once clear and precise. The cuts which the book does contain, though far inferior to those in Gray (which still make that book, in spite of its bulk, the favorite guide in the dissecting-room), illustrate fairly well the regions to which they refer. All through the book the acquaintance of the writers with the practical teaching of anatomy is plainly manifest. The student is told where his dissection will be facilitated and made more instructive by an examination of the bones, of dried preparations, of wet specimens, and of his own person, and one can readily believe that even these "dissecting questions," said to be such a bugbear in the higher anatomical examinations in London, will become comparatively easy to one who has carefully gone over the body after the manner here prescribed.

A TREATISE ON PHARMACY. Designed as a Text-Book for the Student, and as a Guide for the Physician and Pharmacist. By EDWARD PARRISH, late Professor in the Philadelphia College of Pharmacy, etc. Fifth Edition. Enlarged and Thoroughly Revised, by THOMAS S. WIEGAND, graduate of the Philadelphia College of Pharmacy. With 256 illustrations. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $5.00; sheep, $6.00.

This new edition of Parrish's Pharmacy has, under the able and faithful supervision of Mr. Wiegand, been brought fully up to the standard made necessary by the great advance in chemical and pharmaceutical science within the last decade. The book has been thoroughly revised and rearranged systematically, facilitating reference and avoiding repetition. In spite of careful condensation and the omission of all obsolete matter, the volume is considerably increased in size over the previous edition. It cannot, in its present form, be otherwise than acceptable, if not absolutely indispensable, to the student of medical chemistry and to the pharmaceutist.

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OBITUARY.

DR. ROBERT EARLY.

Died, at Lynchburg, Va., December 29, 1883, Dr. Robert Early, in the seventy-first year of his age.

Dr. Early was a native of Carlisle, Pa. He removed from there to Philadelphia when quite a youth, and studied dentistry under Dr. Roper; went to Lynchburg at the age of twenty-one years to practice his profession; soon took high rank as an operator, and continued for almost fifty years the largest and most successful practice in that part of Virginia. Dr. Early was a man of vigorous constitution and untiring energy, of elevated mind and superior judgment, and attained high social and professional relations. He was a faithful practitioner of the old school; conscientious and capable; did not outlive his usefulness, but practiced until within about one year of his death, and was the wealthiest dentist in the State. He was widely known and highly esteemed, not only for professional skill, but as a man of sterling integrity.

DR. DAVID S. GOLDEY.

Died, at Oswego, N. Y., January 14, 1884, of paralysis, Dr. David S. Goldey, aged seventy-seven years.

Dr. Goldey was born in Philadelphia, Pa., in 1808; went to Rochester, N. Y., in 1830, and in 1837 to Oswego, where he established himself in the practice of dentistry, being the pioneer of the profession in that place, and continuing in the business for about forty-seven years. Dr. Goldey was a member of the New York State Dental Association, a man of methodical business habits and of strict integrity.

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

A PATIENT came to me having a cleft palate and harelip, and whose teeth had been previously extracted by a physician. How can a plate be placed in the mouth to be of any service? Is there anything new on this subject?—G. S.

IN reply to Dr. W. A. White, in the January number of the DENTAL COSMOS ("Hints and Queries"), in reference to a well-fitting superior denture which produces nausea when the wearer exposes himself to the open air, I may say that the presentation of facts connected with the case does not seem sufficiently complete or definite to enable one not already *au fait* to determine the cause of so peculiar a symptom, which, for that matter, is of considerable pathological importance, besides being sure to cause dissatisfaction on the part of both patient and operator whenever encountered.

In spite of this deficiency we may advance a theory, founded on suppositions as to the nature of the denture and the condition of surrounding tissues, which gives a plausible explanation. I infer that the denture is of vulcanite or celluloid (in either case, non-conducting), while there is also some tendency to irritation on the part of the mucous and Schneiderian membranes, which may perhaps amount to a mild form of catarrh—a condition anything but rare during the autumn and winter seasons.

When a cold draft chills the superficial capillary system, and the blood is forced to the internal capillaries, this forced intensity of circulation tends to engorge the membrane, whence results the inflammatory action known in common parlance as a "bad cold." A disturbance of the functions short of this extremity may escape observation, and set up chronic irritation of a local nature, giving rise to various phenomena, the cause of which is in many cases anything but plain to a casual observer.

The case in question may fall under this head, since it is known that such influences attack the weaker parts. The non-conducting character of the denture localizes and lends additional force to the morbid tendencies, and chronic irritability of the membranes is heightened until reflex nervous action seeks to correct the trouble by efforts to vomit, very analogous to those sudden impulses of the thoracic muscles commonly termed "sneezing," by which the organism endeavors to expel foreign substances from the nostrils. The immediate excitant of this reflex nervous action is probably the change of electric condition occurring at each respiration, from the unequal heating and cooling of the membranes in consequence of the non-conducting substance in contact with the roof of the mouth. Viewing the matter from this point, I would suggest a metallic denture, preferably gold; and if my premises are correct would expect no further trouble.

It is worth while to remark that the patient, being of a sedentary profession, is very probably blessed (or cursed) with more acute nervous sensibility and excitability than very many other Americans manifest when perfectly fitted with celluloid or vulcanite dentures.—A. H. BEST, M.D., L.D.S.R.C.S.

A NEW DENTAL AMALGAM.—Dr. Best's remarks, published in the DENTAL COSMOS for December, 1883, cannot be fairly allowed to pass without reply. He is evidently unacquainted with the ordinary methods of producing definite alloys by fusion, and is equally uninformed as to the fusing points of metals while combining. It is not at all likely, even if fine silver is fused in a crucible without protection, that oxygen would be present in the center of the furnace in such quantities as to produce the result he condemns, but he will no doubt be surprised to learn that any alloy for amalgams can be perfectly protected from oxidation by either powdered charcoal or sawdust in the crucible, and that the fusing point of the more infusible metal is not necessary to make a perfect alloy. Nothing more is necessary than a temperature slightly exceeding that of the fusing point of the alloy itself. For instance, platinum alloys instantly and perfectly with tin at a red heat, barely visible in open daylight. Silver alloys with tin below a red heat; and, to quote his own words, sodium alloys with mercury without any artificial heat whatever.

The precious metals are present in many amalgams in such quantities that their intrinsic value is double or treble that of the silver, etc. They are therefore not always put in for the name. If this were the case a much smaller quantity would serve the purpose.

Dr. Best says that for many years he used nothing but the most costly alloys without satisfactory results. The cost of an alloy is no guide whatever; the question is whether he tested each and found the system of working which gave the best results. I know at least one fairly good alloy which proved a commercial failure at $3 per ounce, and which is now sold largely, and is highly commended, at over double the price. The alloy is absolutely the same, and the maker took advantage of the tendency of dentists to buy the highest priced alloy and trust to its being the best without an attempt at testing for themselves.

A large proportion of Dr. Best's pleading against the ordinary fused alloys is based on the different fusing points and oxidation. These to anyone accustomed to furnace-work with alloys are defects which have absolutely no existence. His statement that "all the metals used in the manufacture of dental amalgam alloys are to be found naturally combined with each other in varying but always definite proportions," may be assumed to be correct if he assumes that when they were found in indefinite proportions (which is usually the case) they are *not* naturally combined.

If practical experience is to be taken as anything, I can safely say that, so far as my own assays and experience go, the best alloys known at the present time are those which are *not* chemical combinations of atomic weights, and I know no good alloy which is of this class. Dr. Best is unfortunate in his example of iron filings and sulphur, which not only combine in definite proportions but will then take up an excess of uncombined sulphur and retain valuable properties. The so-called "Spence's metal" is a simple proof of this fact. He is also particularly unfortunate in his example of the combination of sodium and mercury. After the crystalline alloy is formed, the excess of mercury which he supposes is poured off, is simply a saturated solution of sodium. If a saturated solution of salt is evaporated until crystals form, the remaining liquid is not by any means pure water—free from salt—as he can easily prove.

The point aimed at is the production of a definite alloy by electro-deposition (yet he puts a "little excess of mercury!"). It would be a delightful criticism on this to obtain samples of this "definite" alloy, made at intervals of a fortnight, and compare the assays. I think I am fairly within the mark in stating that no alloy has ever been precipitated by the electric current which is chemically the same hour after hour. The varying conditions of the bath, the anode, and the current are such as to entirely prevent any absolutely uniform result.

In stating that this alloy is the only amalgam which will adhere to a burnisher Dr. Best is undoubtedly wrong. I know at least two which have been in the market for ten years which have the same very objectionable property, and his is certainly not the only amalgam in existence which will absolutely preserve a tooth without discoloring it.

No doubt Dr. Best has by continued experiments and working with one alloy learned how to use it better than the alloys which evidently he must have tried for a short time and discarded without sufficient trial and experience. He has, like every other maker of amalgams, found the very best, and like all the other makers deserves the credit of having done so; but if he will give me an exact analysis of his alloy and a sample, I will undertake to match it in every essential property by simple fusion of the metals together, without any costly and elaborate preparations. It would have been well if he had tested this point thoroughly before jumping to the conclusion that electro-deposition was any factor in the result.—THOS. FLETCHER, *Warrington*, *England.*

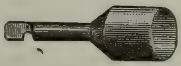
THE FRACTURE OF SECTIONAL BLOCKS.—As a "mechanical dentist" I have felt no little interest in some recent inquiries as to the cause of the fracture of blocks in vulcanization. Having, fortunately, no such trouble myself, I nevertheless feel an interest in the misfortunes of those who have fallen into a rut of bad luck. The attentive reader of the dental journals will recall that there have been complaints of this character at intervals for the last twenty years, just as there used to be, in the old times when metallic bases were in fashion, individual lamentations over the cracking of the then so-called "plate-teeth" under the blow-pipe. Then, as now, the provoking part of the affair was that while one was suffering under this streak of bad luck, he knew that thousands of others were using the same teeth and pursuing *apparently* the same methods without experiencing any trouble.

With a view of making myself useful to my brethren, I have within the last few weeks made personal inquiry of five gentlemen, whose whole time is devoted to putting up artificial work for other dentists, as to their successes and failures. They answered uniformly that they broke no blocks—indeed, could hardly remember when such an accident had occurred to them. One of them said, "the last block I broke was more than a year ago, and that was my own fault." These men were all using teeth of several manufacturers, and declared that whatever they might have to say about the relative ease of fitting the blocks, or of their appearance when finished, the one fact was true of all of them that they did not fracture in their hands. It would seem, then, that the gentlemen contending with this problem are having exceptionally bad luck, and should look carefully to their methods for explanation. The greatest cause of fracture is, in my estimation, to be found in a too great and too sudden contraction of the rubber, and to the too rapid cooling of the blocks. The suggestion of "B," and of J. H. Beebee, in the department of "Hints and Queries" of the DENTAL COSMOS for January, 1883; of R. M. Pelton, in the May issue of the same year; and of "P. R. W.," in the number for January, 1884, are all right to the point and cover the ground. The contractile qualities of rubber are doubtless very great, and just in proportion as the rubber is pure and fine, the blocks thin, delicate, and curved, and the teeth translucent and life-like, is the liability to fracture enhanced. To avoid a too powerful contraction of the rubber, I would suggest to those who are having trouble the combination of two rubbers, using an inferior variety for rim and backing; packing this portion of the flask first, then adding the palatine portion of a finer rubber. Such a plate, carefully vulcanized and neatly finished, ought to be but slightly inferior in appearance and strength to one composed wholly of "Bow-spring" or "Whalebone" rubber. "B's" suggestion, to obviate the dark appearance of the joints by covering the back with a narrow strip of pink rubber, is a good one. Let me add that within the past two years a pink rubber has been introduced far superior to that made some years ago, and with which some very creditable work is being done with plain rubber or celluloid teeth. One of the stronger varieties of rubber may be used for the palatine portion of the plate, and the pink for the gum. This method makes an excellent attachment for a gold plate, and when neatly finished and bleached is scarcely if at all inferior in color to celluloid.

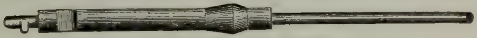
These hints as to the combination of fine and inferior rubbers are not offered as a solution of the problem, but with the thought that those who fail with the exclusive use of a fine rubber may obtain better results, and that this plan may be resorted to until their luck changes, and their troubles, like those of "B," disappear with time.—HENRY WESTON.

TO THE EDITOR OF THE DENTAL COSMOS:

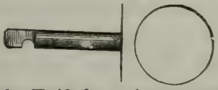
Now that scissors for cutting the gum over the third molars are attracting so much attention, you may think it worth while to call attention to a much simpler and less painful way of doing the same thing. I therefore send you an instrument for this purpose which I devised some years ago and still use. (I use several sizes, the one illustrated being the smallest.) It is simply a revolving tubular knife of about one quarter inch in diameter, fitted to the right angle attachment of the dental engine. I find these tubular knives of much value for cutting into tissue when the patient is not under an anesthetic. When rapidly revolved they produce but little pain, so that with one I have frequently cut three quarters of an inch into the inflamed tissue surrounding the sinus of an alveolar abscess with but slight pain to the patient. I have elsewhere suggested their use in general surgery as explorers, for which purpose they are well adapted, as they take out a minute core of tissue which can easily be subjected to microscopic examination. In use they should be coated with some of the mineral fats, such as petroleum.—WILLIAM HERBERT ROLLINS, *Boston.*



Tubular Knife for cutting gum over the third molar.



Tubular Abscess Knife.



Circular Knife for various operations.

THE NERVE-BROACH.—This seemingly unimportant little instrument occasions the loss of many teeth by its frequent failure to remove the entire pulp. The nerve broach, as it comes to us from the dental dépôt, is unfit to enter the majority of the pulp-canals, and some dentists with drill or bur enlarge the canal to suit the broach instead of adapting the latter to the former. This mighty little instrument is really much too large, and the first thing to be done, especially when small canals in the molars or bicuspids are to be operated upon, is to remove all the barbs with a file, by drawing it from the heel to the point of the broach until it is sufficiently reduced to pass to the apex of the smallest canal; then with a sharp lancet cut three or four barbs from the end of the broach; for with such a broach one can exercise the most delicate sense of touch and may revolve it as often as necessary with slight risk of breaking it. But in the event of such an accident, if there was any cotton on the broken end, take a smaller broach and turn it in the canal to catch hold of the cotton and pull out the piece; otherwise wrap a few threads of cotton on the smaller broach and revolve it in the canal until the piece is engaged and withdrawn, as it generally may be with little trouble.—G. O. S.

I NOTE an article on "Artificial Crown- and Bridge-work" in the December number of the DENTAL COSMOS. Being a good deal interested in this work, I should like to mention to Dr. Williams, the writer of the article, one point on which I differ with him, perhaps wrongly. I quite agree that a tooth does not depend upon the pulp alone for support, but I maintain that after the death of the pulp the dentine *dies*, but the cementum does *not*, as you will never find dentine sensitive in a pulpless tooth, though I think you may find cementum sensitive under such circumstances. I have not experimented with a view to ascertain if such is the case, and would like to know if Dr. Williams has considered the matter in this light. I consider bridge-work the best and most beautiful method of supplying artificial dentures, and in regard to cleanliness, it can be made removable, except in a few cases of teeth with live pulps. When roots are selected, tubes should be fixed in the roots for pivots to fit in, so that the patient can remove the teeth, cleanse them, and return them to their place in the mouth. —G. BEAVIS, *Newport*, *England.*

A NEW METHOD OF FINISHING FILLINGS.—The finishing of gold fillings, especially of approximal surfaces, is very easily accomplished after they have been properly prepared with abrasive disks. Take strips of Japanese bibulous paper, from a half to one inch in width, by four or five inches in length; sprinkle the surface with precipitated chalk, fold the material two or three times to retain the chalk in place; then twist the folded paper into a string, and use the same as finishing tape. This makes one of the finest finishing materials, and can be used even when the teeth are in close proximity.—GUSTAVUS NORTH, D.D.S., *Springville, Iowa.*

TO THE DENTAL PROFESSION.—Through the receipt a few days ago of two letters, each containing a dollar, the fact was first made known to me that my friend, Dr. George A. Mills, in the goodness of his heart, had suggested that each dentist should send me a dollar as a substantial expression of his appreciation of my gift of the rubber-dam.

Now while I do not fail to fully appreciate the very grateful and kindly spirit in which this matter was suggested, I cannot acquiesce in the plan. Although for nearly two years I have been unable to work, I hope that by economy the little I have put by will be sufficient to supply my needs until I shall be able to resume business again. I know it is a very delicate matter to decline a pecuniary testimonial. One is liable by so doing to lay himself open to the charge of false pride; but I hope my friends will not so judge me for declining remittances which make me feel as though I was posing as a beggar. If I had been consulted before the proposition went forth I should have vetoed it immediately.

The moneys I have received and all that may come I will return to the senders. Any who have sent money and received no acknowledgment of it, will greatly oblige me if they will so inform me.—S. C. BARNUM, *Monticello, N. Y., December* 27, 1883.

THE

DENTAL COSMOS.

VOL. XXVI. PHILADELPHIA, MARCH, 1884. No. 3.

ORIGINAL COMMUNICATIONS.

EMBRYOLOGY: WITH SPECIAL REFERENCE TO THE DEVELOPMENT OF THE TEETH AND CONTIGUOUS PARTS.

BY J. L. WILLIAMS, NEW HAVEN, CONN.

[Read before the New England Dental Society, at Providence, R. I., Oct. 4, 1883.]

(Continued from page 73.)

I HAVE said that many of the higher laws which are operative in the more complex organisms are expressed in simpler and therefore more intelligible terms in the lower forms of life. I have also stated that the first process of differentiation following the segmentation of the ovum is the division of cells into two layers, which are known respectively as epiblast and hypoblast. In some low forms of animal existence the cycle of their life history is completed at this point. In the physiological significance of these two layers we may obtain our first glimpse of the manner in which that wonderful and beautiful law of progressive development operates in evolving multiplicity from simplicity of function.

The substance called protoplasm, which forms the basis of every animal tissue, undoubtedly contains within itself the possibility of exhibiting all the known phenomena of animal life. In the amœba, which is generally regarded as the first and simplest form of animal life, and which is but a mass of simple, undifferentiated protoplasm, we find the simplest expression of the vegetative and sensorial functions.* It possesses that peculiar property of responding to external stimulus, to which has been given the name of irritability. The functional activities have not yet become differentiated and specialized. Sensation, digestion, and assimilation are effected by and through the same substance. It moves about and finds its food by means of changeable processes of the cell-substance, which it extends and draws in. The next step is the division of the cell into two or more, and then begins the specialization of function. A part of the cells—those which are situated externally—become more acutely sensitive to external stimulus, while those which take up their position internally lose the property of sensitiveness to the external forces, and become especially concerned in the processes of digestion. In those simple organisms in which the two germinal layers, epiblast and hypoblast, have become well defined, all sensorial function is performed by the first or external layer, while digestion is effected by and through the internal layer.

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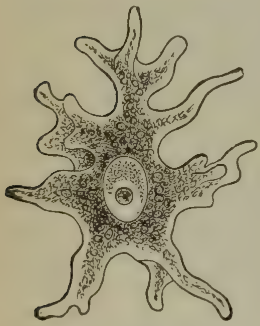
*In 1873 Dr. Carl Heitzmann published his discovery of the reticular structure of protoplasm. While the scientific world seems somewhat slow in recognizing the importance of this wonderful revelation of the microscope, in the future history of histology it will undoubtedly be recorded as second in importance only to the discovery of the ovum. If any advancement is to be made in our knowledge of those wonderful functional activities known as secretion and excretion, it will be as the result of Dr. Heitzmann's discovery of the reticular structure of the elementary parts of the tissues.

FIG. 8.



A creeping Amœba (much enlarged). The form-value of the whole organism is that of a simple naked cell, which moves about by means of variable processes, sometimes extended from the protoplasm of its body, sometimes drawn in. In the center is the round kernel, or nucleus, with its nucleolus.

Haeckel says, "In the Gastræa the simple skin layer did actually represent all the animal organs and functions, and the simple intestinal layer, on the other hand, all the vegetative organs and functions; potentially, this is even yet the case in the Gastrula."

In man, "This sensorial apparatus consists of two very distinct parts, having apparently nothing in common: in the first place the external skin covering (*derma*), together with its appendages, the hair, nails, sweat-glands, etc.; and, secondly, the nervous system, situated internally. The latter includes the central nervous system (brain and spinal cord), the peripheric brain nerves and medullary nerves, and, finally, the organs of sense. In the fully developed vertebrate body these two main constituents of the sensorium are entirely separate; the skin lying entirely externally on the body, while the central nervous system is within, and quite separate from the former. The two are connected merely by a portion of the peripheric nerve-system and of the sense organs. And yet, as we already know from the germ-history of man, the latter is developed from the former. Those organs of our body which discharge the highest and most perfect functions of animal life—those of sensation, volition, thought—in a word, the organs of the psyche, of mental life—arise from the external skin covering."

The accompanying illustration (Fig. 9) represents the germination of a coral in which are shown the different stages leading up to the formation of an organism consisting of the two primary germ-layers. We have first the *monerula* or impregnated cell, then the *cytula* or parent cell, which is developed from the monerula, followed by the segmentation of the cytula and the formation of the "mulberry germ" or *morula*. Next the arrangement of the cells around a central cavity, forming the *blastula*, and then the invagination of the cells to form a *gastrula*, in which we have the external layer (epiblast or ectoderm) and the internal layer (hypoblast or entoderm).

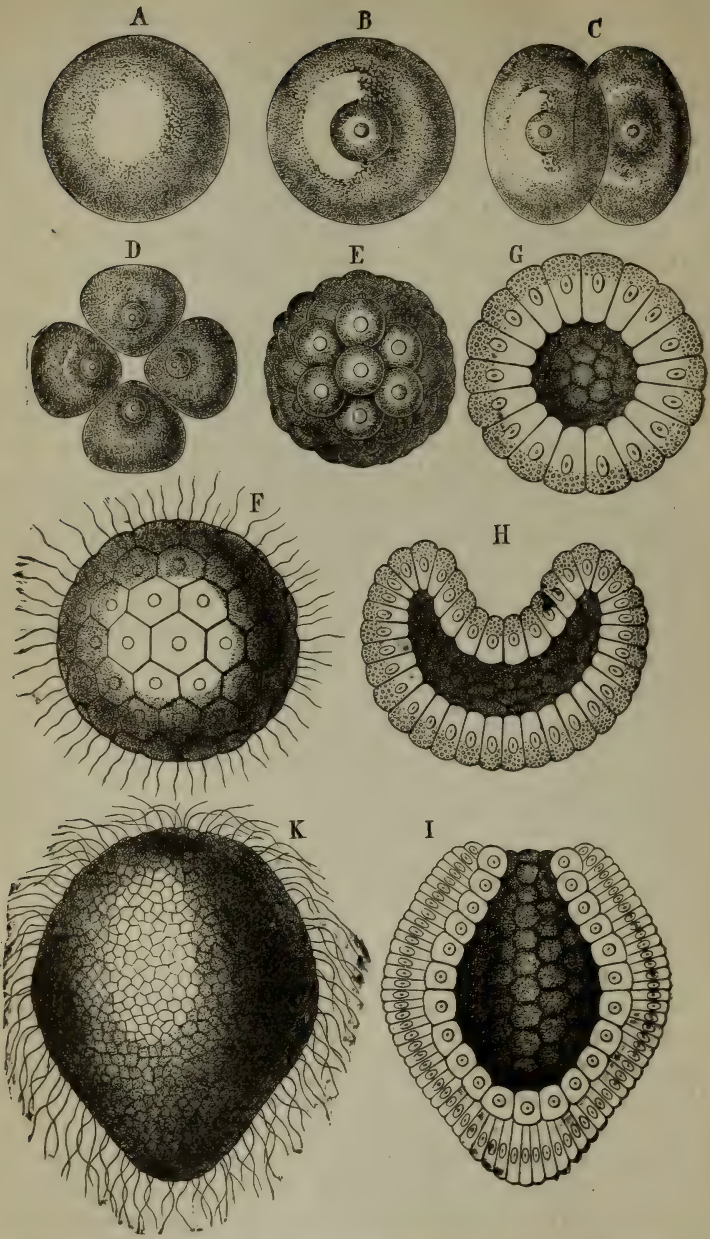
My object in calling special attention to these points is to impress upon the mind a truth which I must regard as of very great importance in the study of the development of animal organisms. Without some knowledge of this truth we can have no very intelligible ideas of the development of any part of the human body, particularly from a physiological stand-point. The mere statement of a fact is a matter of very little consequence; it is the interpretation of the fact by demonstrating its significance in relation to other facts which constitutes true knowledge.

This important principle or law to which I refer may be formulated as follows: *The specialization of that substance which forms the physical basis of all animal life into particular unitary forms, to which are assigned particular functions, and the harmonious arrangement of these unitary forms in one organism.*

Only by studying the subject in this light can we gain an apprehension of those grand underlying principles which give broad and comprehensive views. We have seen that there are forms of animal life which, when completely developed, consist of a double sack formed from two primary germinal layers. As we ascend the scale of life we find a third layer, the mesoblast, forming between these two.

The two primary powers or properties of animal life are sensation, manifested by a response to external stimulus, and digestion and assimilation, or the power of producing physico-chemical changes in matter. These are the two distinguishing characteristics of all forms of animal life from the amœba to man; and the manifold transformations of evolution and development which we witness in ascending the scale of being are simply accessary to these two great functional principles. The exact modus operandi of the development of the mesoblastic layer has never been clearly demonstrated. It probably arises from both of the two primary layers. Its office from its first appearance in the simple ancestral forms of life up through every succeeding form seems to be that of a medium

FIG. 9.



Germination of a Coral (Monoxenia Darwinii): *A*, Monerula; *B*, parent-cell (Cytula); *C*, two cleavage-cells; *D*, four cleavage-cells; *E*, mulberry-germ (Morula); *F*, the germinal vesicle (Blastula) *G*, germinal vesicle in section; *H*, germinal vesicle (inverted) in section; *I*, Gastrula in longitudinal section; *K*, Gastrula, or germ-cup, seen from outside.

for the development of an organism which shall extend, multiply, and intensify the functional activities of the two primary layers. In and from it are developed the entire vascular system, and all of the muscular and connective-tissue elements, including the bony framework or skeleton. It would be a pleasant task, did the scope and limits of this paper permit, to trace in the simple ancestral forms of life the development of the nervous and muscular systems, and of the organs of special sense. But the elaboration of these processes, which in the beginning may have been extended over millions of years, can now be observed in the development of any one of the individual higher forms of life.

I have previously mentioned the infolding of the epiblastic membrane in the development of the mouth, a further elaboration of which process seems in place at this point.

We are now prepared to make a practical application of the claims which I have made for comparative embryology.

If we study the processes of development in any form of animal life we shall learn that from the lowest to the highest one law is operative in the formation of parts which perform the same or similar functions. The mouth is never formed by any other process than an invagination of the epiblastic layer, while that portion of the digestive tract lying below the fauces is, in the early stages of development, a simple tube lined by the hypoblastic membrane, and quite separate and distinct from the mouth-cavity, which afterwards unites with it.

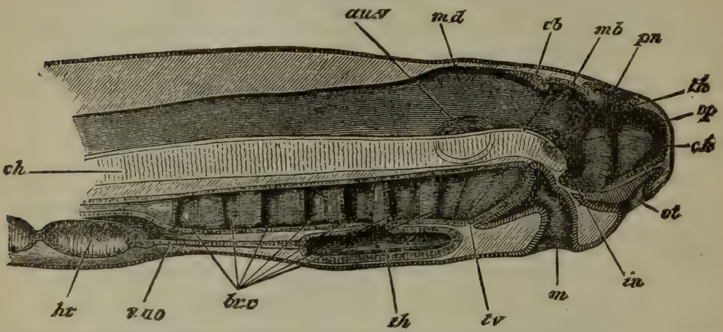
In the Gastrula stage of the Hydrozoa we have an illustration of the manner in which the functions of life are performed by the two primary membranes of which I have spoken. The epiblastic invagination at the mouth opening has become continuous with and almost indistinguishable from the hypoblastic membrane lining the cavity.

In the accompanying diagram (Fig. 10) of a vertical section through the head and the upper part of the body of a larva of Petromyzon the relation of the developing mouth to other parts of the head and body is well shown.

The external development of the mouth is well shown in the head of an embryo chick (See Fig. 7, page 72, Dental Cosmos, February). The two processes of the first visceral arch are seen growing forward to form the inferior maxillary process. That portion of the epiblast which folds inward to form the mouth remains with but little change, as the epithelial lining of the mouth-cavity. The union of the epiblast and the mesoblast in the buccal cavity results in the formation of the epidermal and dermal tissues. In and from these tissues the teeth are developed.

As the first indication of the development of the teeth is seen in the epiblastic layer of cells which covers the mucosa, or proper mucous membrane, an intimate knowledge of its histological features is of great importance. As the results of my own investigations have led me to conclusions which are somewhat at variance with eminent and generally-accepted authorities, I trust you will pardon me if I dwell at some length upon the points which seem to me confirmative of those views.

FIG. 10.

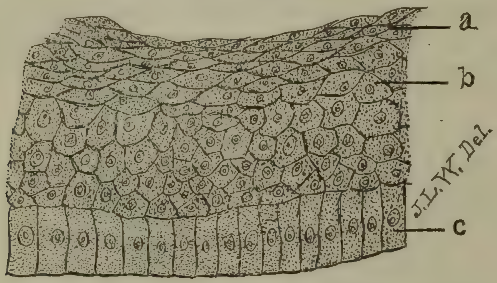


Diagrammatic vertical section through the head of a larva of Petromyzon.

The larva had been hatched three days, and was 4.8 mm. in length. The optic and auditory vesicles are supposed to be seen through the tissues.

ch, cerebral hemisphere; *th*, optic thalamus; *in*, infundibulum; *pn*, pineal gland; *mb*, mid-brain; *cb*, cerebellum; *md*, medulla oblongata; *au*, *v*, auditory vesicle; *op*, optic vesicle; *ol*, olfactory pit; *m*, mouth; *br*, *c*, branchial pouches; *th*, thyroid involution; *v*, *ao*, ventral aorta; *ht*, ventricle of heart; *ch*, notochord.

FIG. 11.



Epithelium from skin of frog.—*a*, layer of flat epithelial cells lying upon the surface; *b*, layer of cuboidal cells; *c*, layer of columnar cells.

At a period coincident with the development of the teeth there may be distinguished three layers of cells: the cylindrical or columnar, the cuboidal, and the flat, which lie upon the surface. The flat or outer layer appear spindle-shaped in edge view, but are broad if seen from their upper or under surface. The cuboidal layer, so called because they present about the same appearance on all sides, occupy a position between the flat cells above and the cylindrical columnar, or prismatic layer, which consists of a single layer of cells standing directly upon the so-called "basement membrane," which separates the epithelial from the subjacent dermal or connective tissue. These cells, which appear columnar in vertical view, are hexagonal if seen in end view. Epithelium is intimately concerned in many of the formative and all of the primary functional activities of life. All of the organs of special sense are formed from the epiblast, for special sense is but a more highly evoluted form of general sense, which was primarily confined to the external skin layer, of which the external epithelium is that portion which remains unchanged and still continues to perform the office of transmitting the terminal nerve-fibers. The entire central nervous system is also transformed epithelium or epiblast. All of that portion of the vegetative organ system which relates to secretion and excretion is constructed from epithelium. In truth, each individual epithelial cell may be said to be a secreting or an excreting organ. Keeping these facts in mind, let us now come to that portion of our subject which is of more especial interest to us as dentists.

(To be continued.)

RADICAL AND HEROIC TREATMENT OF ALVEOLAR ABSCESS BY AMPUTATION OF ROOTS OF TEETH, WITH DESCRIPTION AND APPLICATION OF THE CANTALEVER CROWN.

BY J. N. FARRAR, M.D., D.D.S., NEW YORK CITY.

(Concluded from page 81.)

WHILE extensive separation of the gum from the root and the falling away of the adjacent wall of the socket and surrounding external alveolar tissues resulting from violent disease, with discharge of pus along the outside of the root of the tooth and the formation of pockets that collect and retain food, do plainly indicate the operation of amputation of the root as the best if not the only means of permanent cure, there are other cases which are not so easily determined; because, although there may be great destruction of the apical portion of the socket-walls and surrounding regions of the cancellated structure, the outer plate of the alveolar process mostly remains intact, thus rendering diagnosis more difficult. Indeed, this variety might lead operators to differ so widely as to cause a tyro to lose faith in all treatment except possibly that of extraction.

Each of the various modes of treatment may, however, possess more or less merit, though differing in degree, which shows that after all the cures depend much upon soundness of judgment in drawing the line that shall divide those cases that can be permanently cured without amputation from those that cannot. While abscesses that are recent, as well as those that are older, but limited in size, about the apices of roots that are not degenerated, may be radically and permanently cured by the syringe process as explained in earlier papers, there are old sepulchres of sacs long since wasted away that are so large and ragged, and perhaps accompanied with necrosis, and with degenerated roots projecting into them like stalactites in a cave, that in order to a permanent cure more or less of the root must be removed. In such cases amputation of the root often facilitates the operation of excision of the necrosed bone. Of course, there are conditions bordering along either side of such an arbitrary line that may render it difficult to determine the best method of treatment. In these the syringe plan may seem on the whole advisable, even though subsequent experience may prove otherwise; but in case of doubt it may be the best policy to try it first, though the cure may not be so expeditious, and though amputation may be finally resorted to.

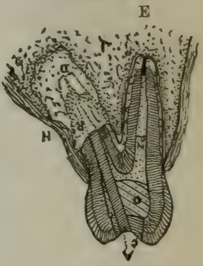
While it is the aim of this paper to show the advantage of amputation in many instances, I do not wish it to be understood that I advocate the operation as being practicable in the hands of all persons, or in the hands of anyone, under all circumstances. To know what is best to be done for the tooth is one thing; to be able to do it may be quite another. But only the most expert can attain the the highest possibilities, and with many it would be better to follow the palliative treatment, if the cure be only temporary; or even to extract the tooth, rather than to injure a large vessel or nerve, which is possible in the lower jaw, in case of the operation being performed by a person unfamiliar with its anatomy. I will go further, and say that even with a correct knowledge of the parts, failure may result from lack of manipulative skill. This operation, like some processes for regulating teeth, may be practicable and easy for one operator and impossible for another, who, having attempted it and failed in it, sometimes publicly proves his own incompetence by condemning the operation he has attempted.

The amputation, of course, exposes in the stub a large opening to the pulp-canal, but this may be securely closed and rendered harmless by the use of an ordinary filling-material, such as amalgam, gold foil, or a screw inserted before or after the operation. I generally use a gold screw (polished at the apical end), introduced after the root is cut off, and then fill around about the screw with plastic materials, such as phosphate of zinc or gutta-percha, as shown in the accompanying drawings, and previously explained in the DENTAL COSMOS for July, 1880.

Description and Application of the Cantalever Crown.

Although a tooth deprived of a portion of its root and socket-support may not be so firm as it was before the disease set in, the amputating operation does not render it less so, but by proper subsequent treatment it may be made considerably more firm, thus rendering it useful for mastication, as well as for preserving it for esthetic purposes, to say nothing of the avoidance of an artificial substitute.

Fig. 21.



Longitudinal sectional view of an upper molar after amputation of a portion of its lingual root—R; also the gold screw, A; phosphate of zinc, Pz—O, and gold plugs, C and E; abscess, D; alveolus, J; gum, H.

The same letters will indicate corresponding parts through all the following diagrams.

When it is possible to use the engine-disk or circular-saws, that is the most speedy method; but when that is not practicable the screw-cut or file-cut engine-bur will do the work well. In cases easily reached (such as the lingual root of an upper molar) a very excellent way is to drill a hole through the root, and then plough each way from it with a fissure-drill. After amputation the sharp corners of the stub should be rounded off by means of a scraper or a spherical bur.

The accompanying figures illustrate several modifications of amputation, and the method of filling the roots, and show also the application of my cantalever thimble-crown, which it is often necessary to use in order to render amputated teeth useful. These are shown so plainly that they need but little explanation.

Fig. 22 illustrates a longitudinal sectional view of a lower molar after amputation of the entire posterior root. B indicates the line of the cut end; G, H, the lines of the gum before and after the cure. These cases are often of the most aggravated type, but where one root and its socket are sound and have light antagonism with the opposite tooth, they may often be made useful for a long time. When the antagonism is too powerful it may be relieved by the use of a corundum wheel, or the tooth may be supported and prevented from tilting by a cantalever thimble-crown resting against another tooth, as will be hereafter illustrated.

Fig. 22.

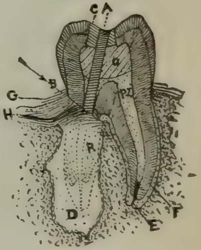


Fig. 23 illustrates a sectional view of a case where advanced decay in the posterior portion of the crown of a lower molar and the presence of a large abscess have led to a double amputation—half of the crown by nature and one root by art—and the remaining portions preserved, the root by a screw, as shown, and the half crown by a gold thimble. The object of preserving comparatively sound roots is the prevention of exposure of adjacent roots by the wasting away of the socket-walls. Although this thimble-crown was original with me in June, 1878, and for several years was supposed to be mine, I subsequently ascertained that practically the same thing had been done previously by Drs. Morrison and Dwinelle. Valuable as this method of saving impaired teeth is, I have increased its usefulness very much by adding a cantalever, as shown in the next diagram.

Fig. 23.

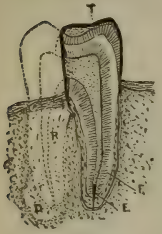


Fig. 24 illustrates a sectional view of three teeth, and an amputated first bicuspid root preserved by a screw, showing the application of the above-mentioned cantalever crown, T, P, set upon the decayed second bicuspid, and made to project over to bridge the space formed by the loss of the crown of the first bicuspid, and resting in contact with the cuspid, so as to connect the broken line of masticating surfaces and prevent tilting forward of the second bicuspid.

Fig. 24.

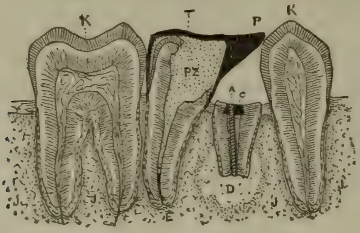


Fig. 25.
Cantalever Bridge.

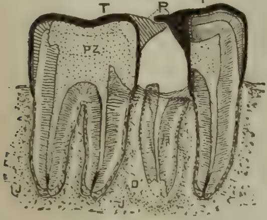


Fig. 26.

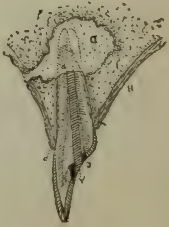


Fig. 25 illustrates the appearance of two molars, the posterior half of one of which is destroyed, showing also the application of two thimble-crowns, which are constructed so as to form a cantalever bridge over the chasm by locking midway in such a manner as to prevent tilting or sliding of surfaces, and at the same time be easily cleansed by the quill or thread. The abscessed root here shown was extracted.

Fig. 26 shows diagramatically an upper central incisor, accompanied by a very large necrotic alveolar abscess of several years' standing, which had so far destroyed the support of the root that it was very loose, rendering it questionable whether it would be better to attempt to save the tooth by amputation of half of the root, or to extract the tooth and supply the loss by artificial means. The former method being finally concluded on, the root was cut off as shown, and the necrosed bone removed with instruments, and the diseased cavity treated by syringing with washes. The case was then allowed a year to rest to enable the tooth to become more firmly fixed, after which time it, with the adjacent teeth, was invested in phosphate of zinc, and a large gold filling (requiring three hours) was successfully inserted, and the case made a perfect and durable success.

TREATMENT OF SENSITIVE DENTINE.

BY DR. P. CALVO.

[Abstract of a Paper read before the Havana (Cuba) Odontological Society, October 28, 1883.]

It is my desire to communicate to my professional brethren the results of my investigations for the past three years in the use of a remedy which, though well known, has not been applied, so far as I know, in dental therapeutics. There is great need of a medicament which, while lessening the sensibility of dentine, will not impair the vitality of the pulp. The acute pain produced in excavating cavities in a certain class of cases deters many patients from submitting themselves for dental operations. The various substances which have been relied upon are caustics of more or less power—chloride of zinc, caustic potash, caustic soda, Vienna paste, arsenic, and the actual cautery. These act, not by temporarily lessening the sensibility, but by destruction of organic tissues, too often causing the death of the pulp.

I have obtained satisfactory results with a substance which, while not endangering the vitality of the tooth, produces sufficient insensibility to allow of the excavation of cavities. I have found that if a cavity, so sensitive that the patient cannot bear its preparation for filling, be temporarily closed with Hill's stopping, and so left for some time, the sensibility is markedly diminished. If filled with gutta-percha instead of Hill's stopping, the result is not the same. Why the difference? I concluded that the answer to this question was to be found in one or other of the materials with which gutta-percha is combined to make Hill's stopping. It is generally understood that it is composed of gutta-percha with certain earthy materials, together with a notable proportion of oxide of calcium (lime). As the virtue does not appear to be in the gutta-percha itself, and cannot be in the inert earths, I concluded that it must be due to the lime. I therefore commenced experimentation with the anhydrous oxide of calcium. This, considered with reference to its chemical action, is sufficiently alkaline to have an affinity for all organic mineral acids, and to combine with them with more or less rapidity. Like potash and soda, it decomposes fats, combining with the acid they contain to form oleates, margarates, and stearates, and the soap which it produces is not soluble in water. In contact with albumen it coagulates the immediate principle, combines with facility with carbonic acid gas and sulphydric acid gas; in hydration it absorbs the aqueous vapor of the atmosphere; if hydrated with rapidity it develops a high temperature, is not deliquescent and is but slightly soluble compared with caustic potash and soda or chloride of zinc.

If a small quantity of the oxide of calcium be placed in the cavity of a tooth it immediately produces a painful sensation, which, however, is of short continuance. When the pain has ceased it will be found that the surface of the dentine has lost its sensibility; but, on removing the upper layer of dentine, we find again marked sensitiveness. I have repeated this experiment many times, always with the same result, and always, so far as I can judge, without injury to the pulp. The pain which is produced by its application is doubtless due to an increase of temperature caused by its hydration, but the quantity used being very small does not create enough heat to affect the pulp injuriously. Bearing in mind that when hydration of lime takes place slowly there is no notable increase of temperature, I carefully dried the cavities before introducing it and sealed them thoroughly to prevent the entrance of the fluids of the mouth. With these precautions, I have been successful in excavating the most sensitive cavities without any pain whatever.

Hydrated oxide of calcium produces the same result, though it requires much longer time, and generally a second application is necessary. This is explainable on the theory that anhydrous lime so used is hydrated at the expense of the humidity of the dentine.

I have practiced this method during the last two years in more than one hundred and forty cases, and always with the same result, nor have I seen subsequently any change in the color of the teeth so treated, or other indication that the pulp had been affected. In teeth the quality of which classes them as fourth-rate, if a gold filling be placed in direct contact with the dentine, the tooth will continue sensitive to changes of temperature which are transmitted through the filling. This painful sensation is sometimes felt for only a few weeks after the insertion of the filling, but sometimes it continues, and finally causes the death of the pulp.

Soon after I commenced my experiments with this agent I communicated my ideas to my friend Dr. Yarini, who immediately put them in practice, and his experience coincides with my own.

There remains to note an explanation of the different action of lime from other caustics, such as soda and potash. The injurious effects of the latter I believe to be due to their great solubility, which permits of their solution penetrating the tubules of the dentine and reaching the pulp; whereas anhydrous lime, being but slightly soluble, exerts its influence on the immediate surface, and, by coagulation of the albumen, limits its caustic action.

In conclusion, I shall be thankful if I have contributed by this suggestion the ability to lessen suffering without producing a pathological condition in a sensitive tooth.

TRANSLATIONS.

SYPHILITIC TEETH.

(Translated for the DENTAL COSMOS from the French of ALFRED FOURNIER, by J. WM. WHITE, M.D., Lecturer on Venereal Diseases and Operative Surgery in the University of Pennsylvania, and Surgeon to the Philadelphia Hospital.)

(Concluded from page 91.)

POLYMORTALITY of children takes place in families of persons affected with dental erosions. We know—and it is an important fact—that hereditary syphilis shows itself with the greatest frequency by what we may term "the extermination of the young." Syphilis kills children as no other disease does: it kills them in utero; it kills them at their birth; it kills them in their first months, or later. If the specific treatment does not correct the disastrous influence of this diathesis, several children of the same family—that is to say, two, three, four, five, six, or more, may pay fatal tribute to the hereditary poison. It is this fatality which we term—so many catastrophies of this kind passing under our eyes—the infantile polymortality of syphilitic families. It is a curious coincidence that this multiple mortality of the young is met with in families where we observe dental erosions. Given a child affected with dental erosions; go back to the family antecedents, and you will generally learn that several brothers or sisters of this child were still-born or died young. You will often be surprised at the unusual mortality of the children of this family.

In the following observations, all relating to persons affected with dental erosions, the figures refer to the mortality of children in each family. Observation of Pietkiewicz,[1] 3 dead out of 5; Chaboux,[2] 3 dead out of 4; Russell,[3] 3 dead out of 4; Fournier, 3 dead out of 4; Stanley,[4] 4 dead out of 9; Fournier, 4 dead out of 8; Stanley, 4 dead out of 6; Parivaud,[5] 4 dead out of 5; Rivington,[6] 4 dead out of 5; Fournier, 5 dead out of 9; Fournier, 5 dead out of 8; Fournier, 5 dead out of 8; Coupland,[7] 7 dead out of 12; Fournier, 7 dead out of 9; Coupland, 9 dead out of 15; Lancereaux,[8] 9 dead out of 12; Carré, 11 dead out of 12. What a striking parallel! On the one hand polymortality of children in syphilitic families; and on the other polymortality of children in families where dental erosions are met with. Is not this comparison significant? Is not this a positive demonstration?[10]

Thus, to recapitulate—frequent verification of syphilis in the parents of patients affected with dental erosions; frequent verification in the patients themselves of heredo-syphilitic symptoms; polymortality of the young in families where the erosion is observed—here are three facts of the highest importance, which establish very clearly, to my mind, the pathogenic relation of dental erosion with syphilitic heredity.

A question remains to be solved. In what proportion of frequency are dental erosions due to a heredo-syphilitic influence, in comparison with other causes capable of producing them? Unfortunately, this question is not yet answerable in the present state of our knowledge. All that we can say of it is that syphilis certainly constitutes a common cause of dental erosions. It seems to me even undeniable that it constitutes the principal cause. Dental

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[1] Observation before quoted.

[2] Of Certain Lesions of the Naso-pharyngeal Region which should be attributed to Syphilis. Paris Theses, 1875, No. 430, p. 37.

[3] *British Medical Journal*, 1869, Vol. IV., p. 86.

[4] *Medical Times*, 1861, Vol. II., p. 240.

[5] Thesis of Couzon (Contribution to the Study of Interstitial Keratitis), Paris Theses, 1883, p. 31.

[6] *Medical Times*, 1872, Vol. II., p. 433.

[7] *Medical Times*, 1880.

[8] Op. cit., page 330.

[9] *France Médicale*, 1877, p. 106.

[10] It has been necessary for me to omit, in the argument which has preceded, a number of accessary peculiarities of real interest. The following are some of the most important:

It has been remarked that, in syphilitic families, most frequently it is the eldest child, or the eldest of the surviving children, that presents the erosions characteristic of syphilis, while the younger ones are free from them. This fact has an easy and rational explanation to me, in the habitual and undisputed decrease of the heredo-syphilitic infection under the influence of time and treatment. There erosions of specific origin present themselves by hundreds while those attributable to other causes are singularly limited in number. Eclampsia would certainly be claimed by M. Magitot and his partisans as having large influence. But here the influence of syphilis would reassert itself, for infantile eclampsia is often but a symptom of hereditary syphilis. Numbers of syphilitic children are afflicted with convulsions;* many die from them. Then, among these cases of dental erosion attributed in mass to eclampsia there are necessarily a certain proportion which belong in fact and by right to syphilis. However this may be, the question of relative frequence cannot at present be decided, for the materials for reliable statistics on this subject are wanting.

Another point remains for us to consider. Have all dental erosions the same semiological value? Should they all, to the same degree, raise the suspicion of a specific origin? It is certain that syphilis can cause them all, whatever they may be; but it appears none the less evident that it produces certain types of erosion rather than others. On this account those types will have for us a diagnostic value which others would not. Without doubt, in view of the newness of the subject, it would be imprudent to yet specify anything precise or definite in this regard. Nevertheless, we are able at present to formulate the few following propositions, as expressing the facts observed up to the present time:

First. The punctated, the cup-like, the facet-like, and the saw-like erosions of the free edge have but little or no value as evidences of

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are cases, however, where several children of the same syphilitic family are affected with dental erosions. To quote but one example, Moon (*Monthly Review of Dental Surgery*, translated in the *Progrès Dentaire*, 1877,) has made a curious observation where, among three children of the same syphilitic family, there were two—one sixteen and the other eleven years old—who had dental erosions. In cases of this kind, where several children of a family are affected with dental erosions, it has been noticed that "these lesions are more marked in the elder one and gradually grow less in the younger ones." (Hutchinson, the *Medical Times*, 1861, Vol. II., p. 624.) It may be that in a syphilitic family where several children are affected with dental erosions, others are exempt from them, without their escape being explained by any other reason than that of the law of diminution, of which we have just spoken. In the case of Moon, before quoted, we see a child of fourteen years presenting healthy teeth, while his elder and his younger brother (younger by three years) were affected with characteristic erosions.

Are dental erosions of syphilitic origin transmissible by heredity? This point is yet unsettled. An observation by a foreign author, Barraclough (*Medical Times*, 1876, Vol. II., p. 349,) shows us two brothers, "syphilitic," (?), who, affected with dental erosions, had between them six children, all affected with like or analogous erosions. But this case, curious as it may be, does not possess details sufficiently precise to be demonstrative.

* See Syphilis and Marriage.

a heredo-syphilitic influence, because we meet with them frequently outside of all specific heredity.

Second. The furrow-like erosion (sulciform erosion of Parrot) is more important, but it is indisputable that we observe it with a certain frequency in conditions where syphilitic heredity can be absolutely excluded.*

Third. The atrophy of the dental cusp—notably that affecting the first molar and constituting the short, flat tooth—has a more precise meaning, because this is a favorite form of the malformation when caused by syphilis.

Fourth. But the best sign, one which can be given as an almost certain evidence of syphilitic heredity, is the semi-lunar notch of the free border—that which is called the Hutchinson tooth. This special form of erosion—above all when it occupies its chosen seat, viz., the superior central incisors—is a diagnostic element of incontestable value.†

I cannot go so far as Hutchinson and say that this is a pathognomic sign, that this malformation of the superior central incisors suffices to prove hereditary syphilis. However, I have yet to find a single case where this sign has deceived me; I have yet to find a single case of this dental malformation, "the crescentic notch of the free border," which has been produced by causes other than those of syphilitic heredity; so that, if I confined myself to the results of my personal observation, I would be very much tempted to affirm the specific nature of this Hutchinson tooth. But I believe that, in a question so new, prudence is necessary, and that it would be premature to form absolute conclusions. I will confine myself then to stating the condition of our accurate knowledge on the subject at present, viz., that the semi-lunar notch of Hutchinson is a formal presumption —perhaps even a certain sign—of syphilitic heredity; that no one has yet confronted the semiological value of this dental malformation with a single absolutely authentic contradictory observation; but that, before giving to this valuable sign the term of "pathognomonic"—before considering it as of itself furnishing an absolute, irrefutable demonstration of syphilitic heredity—it must yet await the confirmation of a more prolonged experience.

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* In more than twenty cases I have verified the furrowed tooth in adults who have recently contracted syphilis. A short time ago, for example, I observed erosions of this nature upon a young man of twenty-five years, affected with a hard chancre several weeks old, with roseola, mucous patches, etc. In cases of this kind the following problem is met with: Either the furrowed erosions are exclusively of syphilitic origin—and then hereditary syphilis does not constitute an immunity against later syphilitic contamination; or the furrowed erosions are not of a syphilitic order. The last solution of this problem appears to us preferable in all respects.

† Mr. Hutchinson, with whom I had the honor of conversing upon this question, admits as "specific teeth" only the superior central incisors. According to him, every semi-lunar notch affecting the superior central incisors would be an absolute sign of syphilitic heredity. But this same lesion affecting other teeth, "would no longer have any signification relative to specific heredity." This statement seems to me unacceptable as regards its second clause. Why attribute a semiological signification to a lesion affecting certain teeth, and deny all value to this same lesion when it affects others. Why is it that that which is an absolute evidence of syphilis upon the superior central incisors becomes a dead letter on the superior lateral incisors, or upon the inferior incisors, or upon the cuspids, inasmuch as there are cases where other teeth are affected with semi-lunar notches at the same

MICRODONTISM.—Dental erosion, which has thus occupied our attention at length, is but one lesion among many. It is therefore very improper to make of it the exclusive characteristic of what is termed the syphilitic tooth. In reality the influence of hereditary syphilis shows itself upon the dental system in multiple forms, of which erosion is but one, and of which many other kinds are no less curious or important from the stand-point of retrospective diagnosis.

Microdontism is among the dental malformations which have remained almost unrecognized, owing to the exclusive attention accorded to erosion. It is quite common, however. It is mentioned in a number of observations, and for my part I have frequently met with it in my patients, either as an isolated lesion, or, more commonly, associated with other dental malformations. So that, without attributing to it an accurate or special signification, I have been led to consider it as an important and valuable diagnostic element. Its name defines it. Derived from two well-known Greek words (*mikros*, small, and *odons*, a tooth), it describes the condition of a tooth abnormal through slenderness of proportions—a dental malformation consisting of an unusual smallness of the tooth. The tooth thus affected is lessened in all its dimensions—height, breadth, and thickness. It is at the same time short, narrow, and thin—a small tooth, almost rudimentary in certain cases.

Microdontism is never a general condition of the entire denture;

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time, in the same manner, and to the same extent as the superior central incisors? I had lately in my service just such a case, the cast of which I showed to Mr. Hutchinson without succeeding in making him change his opinion. It was the case of a young patient who presents superb semi-lunar notches (Hutchinson type) upon six teeth, viz., the two superior central incisors and the four lower incisors; and all these notches were absolutely identical on these different teeth. Now, if we admit syphilis as the origin in the malformation of the superior central incisors, how is it to be supposed that it had no influence in the concomitant and identical malformation of the other teeth? And, if we attribute a high diagnostic value to the malformations of the superior central incisors, why deny a like signification to the same pathological condition of the neighboring teeth?

at least, I have never met with it under this form. On the contrary, I have always seen it affecting but a few teeth in the midst of an otherwise normally developed denture. Sometimes it is even confined to a single tooth. The teeth affected by it in order of frequency are the superior central incisors, the superior lateral incisors, and the inferior central incisors. In a case of Lannelongue's it affected the four superior incisors. It is found in all degrees, and is often so slight as to be passed unperceived in a superficial examination. Such is the case of a patient we are now treating in our wards for symptoms of hereditary syphilis, and who presents three teeth notably less than normal—two inferior central incisors and one superior lateral incisor, not however, so reduced, that the anomaly would strike an observer at first sight. At other times, on the contrary, microdontism is more marked. It then constitutes a real deformity, which could not be passed unnoticed. Two examples may be given: A young man of eighteen, affected with different manifestations of hereditary syphilis, presents the following curious aspect: Alongside of three superior incisors, normal in form and development, the left lateral incisor was absolutely reduced as regards volume in all proportions; it was ridiculously small, especially as regards length, and presented at the most two-fifths of the physiological size it should have had. In the case of a child, ten years old, the son of syphilitic parents and syphilitic himself, we observed this other more complex anomaly: First, the superior central incisors were strongly notched in crescentic form on their free edge (type of the Hutchinson tooth); rounded off on their angles, and singularly small, short, narrow, and thin, and measuring but half the length of the lateral incisors. Second, the inferior left central incisor presented a very marked transverse furrow about half a millimeter below its free edge, but was normal as regards size. Third, the inferior right central incisor was reduced in all its proportions, and measured only half the height of the corresponding left tooth.

These examples give an idea of this variety of dental malformation, which constitutes a precise clinical sign, easily verified, and equivalent in diagnostic value to that of erosive malformations. But this malformation may be still more marked—there may be such a failure of development that there is no exaggeration in designating it as dental dwarfing. I have before me a specimen of the kind drawn by Hutchinson.[1] The two superior incisors do not protrude from the gums further than one or two lines. I have observed several analogous cases. In one of them the incisor was so small that it had the appearance not of a tooth, but rather of a small lump of enamel appearing through the gum.

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[1] A Clinical Memoir on Certain Diseases of the Eye and Ear Consequent on Inherited Syphilis. London, 1863. Fig. 7, plate I.

Singular as this mode of action of syphilis on the dental system may appear at first sight, it is nevertheless authentic and duly demonstrated. It has been observed a number of times, and under circumstances which leave no doubt of its pathogenic connection with hereditary syphilis. This is, however, not an isolated fact. Other curious arrests of development take place in hereditary syphilis and terminate now in the atrophy of an organ, such as the uterus or the ovary, now in a kind of general atrophy which we have qualified by the name of infantinism. It is a defective nutrition of the same nature which causes this dwarf tooth. Microdontism is the infantinism of the tooth, and it is derived from a defect of nutrition which clogs the evolution of the dental organ in the same manner as a defect of nutrition of the same origin interferes sometimes with the development of other organs, or even with the development of the entire individual.

Dental Amorphism.—A third form of the heredo-syphilitic influence is constituted by dental amorphism, so termed from "*a*," privative, and *morphe*, form. It is simply the condition of a tooth which, instead of its physiological form, has assumed some other shape. This variety may be placed very nearly in the same class with erosion as to frequency. Here again, as in the preceding variety, it is but a question of partial and non-systematized malformations. In other words, amorphism concerns neither the dental system in a general way, nor any class of teeth in a particular manner; it affects separately one or more teeth, and when it affects several it is far from confining itself to the law of symmetry which is so constant and so remarkable in the erosive malformations.

In a first group figure teeth with simple deviation in shape from the normal type, having lost more or less of the characteristics of the class to which they belong and assumed those of another class. Thus we sometimes observe incisors which, in place of being flattened antero-posteriorly, are thickened, conical, cylindrical, and approach the form peculiar to the cuspids. It is thus, reciprocally, that the cuspids, in place of being cylindrical in body and with conical cusps, become flattened antero-posteriorly, with a horizontal edge. A fine example of the kind is now among my heredo-syphilitic patients. She has a superb set of teeth; but examined anatomically, a singular anomaly is presented, which would probably not have been noticed at first sight. The four cuspids are, as regards form and appearance, like incisors, flattened antero-posteriorly, and in place of a pointed cusp, terminate in a horizontal edge, like the incisors. They are identical in every respect with the neighboring incisors.

Conversely, another patient in our wards, a few months ago, presented two superior lateral incisors literally transformed into cuspids.[1] This transformation of type is not generally apt to be so complete. These two are the only cases where I have observed it to such a degree. But we frequently meet with heredo-syphilitic patients whose teeth are modified in type by some partial anomaly—notably by characteristics borrowed from a different class.

A second group comprises divers malformations, changing in many ways the form of certain teeth, and sometimes ending in true monstrosities. The incisors, for example, present themselves frequently with a free border of abnormal shape. I have seen several times (an example is at present in our wards) the inferior incisors terminate in an oblique edge, as if they had undergone a transverse cutting. At other times we have what are called fluted teeth, that is to say, they are overrun on their crowns by projections,—either transverse or vertical ridges which separate small gutters. At other times we observe on a tooth some accessary tuberosity—a supernumerary tooth. One of our patients had a small molar flanked on its interface with a kind of conoidal apophysis.

Then come the strange and innominate forms. The superior lateral incisors appear sometimes strangely reduced in their transverse diameter—prolonged vertically, and "resembling ivory pegs more than teeth" (Hutchinson). We have seen certain teeth, small, stunted, curtailed, conoidal, assuming the shape of "horns." Hutchinson has represented in his book[2] a superior central incisor which, at once notched and transversely widened on its free edge, recalls sufficiently well the appearance of a tricorn (three-horned).

A special form is furnished us by the variety described under the name of the "pegged tooth" of the English writers, who seem to accord it a special interest, to judge merely from the frequency with which we find it mentioned in their observations.

In this form the tooth is notably reduced towards its neck, as if cut in upon its lateral borders at the level of the neck, causing it to appear enlarged at its edge. This form is described by M.

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[1] This patient, aged thirty years, presented, in addition, the remains of a semilunar notch upon her two superior central incisors. One of her sisters, five years older, presented likewise multiple and typical dental malformations. Both were evidently heredo-syphilitics, and owed to their original diathesis different symptoms with which they had been affected in their infancy and youth—(keratitis, iritis, gummata, etc.). See Thesis of Couzon (Contribution to the Study of Interstitial Keratitis in Hereditary and Acquired Syphilis, Paris, 1883) where this observation will be found related in detail.

[2] Op. cit., Fig. 6, Plate I.

Parrot, in the first dentition, under the names of axe-blade atrophy, axe-like tooth.[1]

Finally, the tooth may be so absolutely changed as to be shapeless. I have seen, for example, in a young man affected with hereditary syphilis an inferior cuspid so strange in appearance that it in no way resembled a tooth. It was a sort of bony production, very irregularly cylindroid, yellow, rough, angular, knotty. One would have said it was a pebble, rather than a tooth, planted in the gum. Hutchinson has observed and represented a case of this kind where several teeth were affected with extraordinary malformations.[2] M. Magitot, who has examined Hutchinson's collection, says he found in it several types of these misshapen teeth, "having the appearance of deformed stumps"—of truncated cones, true morphological monstrosities.[3]

Dental amorphism, in the different varieties which it can assume, usually occurs with one or the other of the two classes of malformations previously studied, erosion and microdontism, sometimes with both. This is important to notice, for such a coincidence is significant and well shows that these forms of dental anomaly are connected as regards origin—that is to say, derived from one and the same cause. For example, in one patient we have at the same time—First, typical erosions, notably the crescentic erosion of the superior central incisor; second, very marked lesions of microdontism; third, lesions of amorphism on the cuspids, which resemble incisors.

Vulnerability of the Dental System.—In a general manner we may say that the tooth affected by syphilis, whatever may be its objective form, is a tooth pathologically constituted, which carries in it the elements of decline, of disorganization. It is essentially a vulnerable tooth—that is to say, predestined to secondary degenerations for the following reasons: First, the syphilitic tooth is generally poorly protected against exterior influences. In the eroded forms, for example, it is not protected at the level of the lesion, or only with a layer of enamel more or less abnormally thin. In the second place, the eroded tooth has not only an imperfect surface, but zones of globular dentine, as we have previously seen, furrow it in its entire thickness. According to M. Magitot, "it is a tooth composed of parts deprived of homogeneity and equilibrium in the relative proportions of their anatomical and chemical elements." Besides, M. Parrot has established that the enamel of this tooth is not only thinned, but furthermore that it is pathologically affected; that it is brittle or chalky and only slightly adherent.* Sometimes also, the syphilitic tooth presents itself "composed of lamellated layers, irregularly superimposed, not adherent or feebly so between themselves, and recalling to mind the stratifications of an oyster shell. This variety was designated by Dr. Delestre, a distinguished dentist, under the name of the "schistous tooth."

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[1] *Progrès Médical*, 1881.

[2] Trans. Path. Soc. London, Vol. x., 1859.

[3] Clinical Studies of Dental Erosions, p. 12.

Finally, alterations more singular and still undetermined as to their nature are sometimes met with in our patients. M. Magitot recently related to me that he had observed on a heredo-syphilitic patient several teeth strangely affected. He had never seen anything like them previously. "They were," he said, "absolutely greenish teeth—greenish on the surface and throughout; composed of a substance of slight resistance, friable, very extraordinary, unknown to me, but nevertheless eminently pathological."

All these anomalies, all these defects of structure, constitute so many conditions of lessened resistance, of precarious vitality, of easy destruction and premature decay.

The syphilitic tooth is also habitually subject to secondary deteriorations, which change its appearance and lessen its chances of duration. It very frequently presents traumatic lesions—traumatic through progressive wearing, fracture, chipping, crumbling, etc. The dental cusps affected by erosion, thinned, partially or totally deprived of enamel and brittle, do not long resist the wear of mastication, but break, shell off, and are destroyed. It is thus that these small stumps of dentine, which constitute the cusps of certain eroded teeth, crumble, break, and disappear in the course of a few years, leaving a rough surface which the alimentary trituration soon polishes. The semi-lunar notch of Hutchinson is formed in no other way. We have seen that at the commencement the tooth destined to show later this special malformation presents a free edge sown with stalactiform projections, with small conical eminences, with spinules, etc. All this roughness, the remains of the initial process of erosion, disappears in a short time, leaving in its place an empty notch which soon becomes polished from use. Such is likewise the mechanism of "the short tooth"—the type so commonly met with on the first molars. It is but consecutive to the functional attrition of the cusp of the tooth—that is to say, to the breaking down and disappearance of the entire eroded zone. It is not rare to meet with subjects who, still very young, present several of their teeth worn as if they had been filed, having lost a quarter or even a third of their crowns, and terminating in a plane surface, polished and yellow, where the denuded dentine appears. Dr. Chaboux relates the case of a young girl of thirteen, whose cuspids and first molars were absolutely "worn flat," the crowns having almost entirely disappeared.*

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* See also Descamps on Dental Atrophy in Children produced by Hereditary Syphilis. Paris Theses, 1872, No. 305.

Syphilitic teeth are frequently affected with caries, and that at a very early age. It is a general law that caries naturally attacks teeth which are imperfectly covered by enamel, commencing at the points least protected, and in consequence most vulnerable. Eroded teeth are exceedingly subject to caries, which frequently invades them at a very early period.† Regarding the first dentition, it is not rare to meet with children who, at the age of four years, have their incisors decayed. We have seen the superior incisors already partially decayed as early as the second or third year. In the second dentition, a large proportion of the teeth affected with erosion undergo speedy decay. At a slightly more advanced age, it is usual to find certain of these teeth in the condition of shapeless stumps. The first molars are the teeth most exposed to these secondary degenerations. They are early invaded by caries and are often destroyed in youth.

There are nevertheless some exceptions to the general rules which we have established. Certain teeth affected by syphilis resist and are preserved for a long time. Let us place in the first rank those which present the variety of erosion designated under the name of the semi-lunar notch. It is common to find even in adult age, Hutchinson's teeth which, despite encroachments more or less profound of their free edge, remain free from caries. We had lately in our wards a woman of fifty-seven years, certainly an heredo-syphilitic, who still had two healthy lower cuspids, with the manifest remains of a notch in their cusps.

We have now considered the most important and most common manifestations that hereditary syphilis shows upon the dental system. I am certainly far from having exhausted the subject, and a number of interesting peculiarities remain for me to notice. First, a white (milky) stain, which under the form of a linear stripe, runs horizontally over the crown of a tooth—not, as in erosion, a loss of substance, a groove cut in the tooth, but simply a white streak, without irregularity of surface. It is purely and simply a dental zone, differing from its neighboring parts by its particular coloring, which is a dead white, chalky, milky, cutting in sharply upon the normal tint of the tooth. Sometimes, however, it presents a more softened tone—is simply opaline. It is absolutely transverse and regularly horizontal, measuring from a half to one millimeter, and running over the whole surface of the crown from one lateral border to the other. It is a lesion in every respect like that which we call the furrow-like erosion—only it is a streak and not a groove or furrow. Its most frequent seat is the pair of superior central incisors: and, it is a remarkable peculiarity, and significant, that when this white streak affects these two teeth it affects them in an absolutely symmetrical manner, showing itself at the same level of the crown, constituting another analogy with erosion. In a word, the white streak is the counterpart of the dental furrows we have previously studied. We might say that it is a simple variety. Very probably it comes from the same process as that of erosion, with slight secondary differences of anatomical constitution. At any rate we cannot entertain doubts as to its pathogenic relation with hereditary syphilis. I do not pretend—it would be exceeding my experience on this point—that syphilis is the sole cause of its production;* but I declare that it is the origin of it in a number of cases, and that in a very manifest manner. Since my attention was called to these milky streaks, I have met with many of them upon patients certainly affected with hereditary syphilis, and under conditions where it would be impossible to attribute them to any other cause whatsoever. I have been able to recognize, to ferret out—excuse the term—hereditary syphilis, simply by the verification of such streaks. In proof of this is the following case: A few weeks since a young girl, nineteen years of age, came into our wards with a simple *phtheiriasis*, remarkably spread out and profuse as regards eruption. On examining this patient, I chanced to observe—for her complaint was certainly not of a nature to direct my researches in that direction—two superb milky streaks upon the superior central incisors, symmetrical and parallel to the free edges of the teeth. Then, curious to go back, if it were possible, to the origin of this anomaly, I began to search. An examination brought to light in our patient antecedents of the most suspicious kind, viz., numerous and prolonged eruptions during early infancy; very persistent and even serious disease of the eyes, judging alone from the duration; disease of the ears, almost complete deafness, lasting more than a year, etc. Then I summoned to the hospital the mother of the patient, and learned from her: First, that her husband had syphilis and was twice married; second, that he had very probably infected his first wife, who, becoming enceinte three times, had three miscarriages; third, that she herself had received the disease from him shortly after her marriage; fourth, that in 1867, for example, she was treated here by M. Bazin, for "mucous patches and copper-colored eruption;" fifth, that three years later she was affected with new symptoms of syphilis in the mouth, etc.; lastly, that, out of six children which she had by her husband, four were dead, three of them almost at birth, etc. In a word, on the one hand we had well authenticated syphilis in the father and mother of our patient, attested by the most categorical proofs; and on the other hand specific heredity was shown in our patient by the order of antecedents which it is most common to meet with in such a case. This syphilitic heredity was implied by no morbid manifestation for the moment. The "milky streak" of the superior incisors, and nothing else, called my attention to it. Mark what diagnostic service this little sign may render!

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* Op. cit., p. 38.

† See Magitot—op. cit.

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* We refer here to the true white streak, such as I have just described, and not to those simple white spots which are so common on the teeth in the form of little round or oval marks, circumscribed, placed at random, etc. These latter carry with them no diagnostic signification and are foreign to our subject.

Again, it is very common to find among heredo-syphilitics irregularities of implantation, or of reciprocal disposition of divers teeth. Certain teeth leave their alveoli in a faulty direction, and present themselves now as if twisted on their axes, and now obliquely inclined in different ways. This anomaly certainly is but commonplace, and the only curious feature it offers is the frequency with which it occurs in our patients. One of these varieties, however, is a little peculiar. Thus, the superior central incisors affected with semi-lunar notches frequently present themselves with a convergent obliquity which constitutes one of the attributes of those which are called the Hutchinson teeth.

Secondly, syphilitic teeth are sometimes spaced in a very singular manner; that is to say, separated one from the other by large empty spaces. In a number of patients the incisors, especially of the lower jaw, are widely distant from each other, and equally distant from the cuspids. These distances are not always owing to the fact that the teeth, more or less reduced in volume, leave intervals between them proportionate to their small size. They have their origin much more frequently in a vicious separation of the alveoli; that is to say, in a bony malformation, which I should state has not yet been anatomically studied.

The bones, therefore, have sometimes their part in the creation of these divers dental anomalies. The maxillæ exhibit, also, in some instances, the influence of the diathesis. We frequently meet with diseased maxillæ in children born of syphilitic parents. M. Parrot has established many a time bony lesions of the maxilla in connection with divers malformations of the teeth. He even lays down the principle "that most diseased maxillæ, those most filled with osteophytes, are those which contain the most seriously affected teeth."* The specimens in his fine collection amply verify the proposition announced by my learned colleague. Other observers have likewise described lesions of the maxillæ in congenital syphilis. Hutchinson, for instance, has seen in a young child a bony lesion on the alveolar brim cause at first a suppurative swelling of the gum, and then the expulsion of four incisors under process of formation; and, finally, the issue of a large sequestrum, formed of a considerable portion of the dental arch.[1] In another case, related by the same author, the crown of a superior central incisor was thrown out by a suppurative periostitis. It is allowable to attribute to the same influence certain anomalies or arrests of development of the dental arches which we sometimes meet with in the same patients. For example, one of my patients, a young man, affected with divers symptoms of hereditary syphilis, presents at the same time with very well-marked dental malformations a curious disposition of the lower maxilla. The lower teeth, in place of entering within the superior arch when the mouth is closed, overlap and lock on the right half of the superior arch.

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* *Progrès Médical*, 1881.

Another fact often noticed consists of the malformation of the superior dental arch in the segment corresponding to the incisors and cuspids, so that in the occlusion of the teeth the incisors fail to pass each other, or even sometimes to touch. Moon describes this "defect of vertical development of the superior maxilla" as a peculiarity not uncommonly met with among hereditary syphilitics.[2] Likewise, M. Lannelongue has related an observation of a heredo-syphilitic patient in whom the superior alveolar brim was scarcely developed.

It appears legitimate to attribute to bony lesions other anomalies of a rarer kind, as for instance the permanent absence of certain teeth. Sometimes even—but this is exceptional—several teeth default symmetrically. Certain patients present in the lower jaw a large empty space between the permanent incisors and the first molars. This anomaly, according to M. Parrot, is the result of a true atrophic process of the maxilla.[3]

What, then, is the diagnostic signification of these anomalies? They do not constitute pathognomonic signs of hereditary syphilis. Not one of these signs is sufficient in itself to *prove* a syphilitic origin. All these lesions may be met with, independent of syphilis, on patients unsullied by this original stain. That the causes foreign to syphilis concerned in the creation of these diverse lesions are yet unknown, or imperfectly known, there is not the shadow of a doubt. But these causes exist and are active, and the day will come when they will be described. According to all evidence these lesions result from a nutritive trouble, or from an arrest of development. Who will believe that such lesions cannot result except from syphilis as a unique and exclusive cause? But it is not less certain that syphilis is capable of originating such lesions, and that it is a most active cause in producing them. Clinical observation establishes that, given a patient affected with one of the preceding dental malformations, there is a great probability of meeting with hereditary syphilis in his antecedents. They raise the suspicion of a syphilitic heredity, and direct in this sense the investigations of the clinical student. They do not surely, of themselves, prove syphilis, but they should always cause it to be suspected. It is the work of the physician to ascertain by a general examination of the patients, by a minute analysis of the antecedents, if the suspicion born of this special sign is or is not justified by the clinical facts.

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[1] Transactions of the Pathological Society of London, 1858, vol. ix.

[2] *British Medical Journal*, 1879, vol. ii. p. 989.

[3] *Op. cit. Progrès Dentâire*, 1877.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

The New York Odontological Society held a regular meeting at the house of Dr. N. W. Kingsley, No. 25 West 27th Street, Tuesday evening, December 18, 1883.

The meeting was called to order at 8 o'clock, the president, Dr. Wm. Jarvie, Jr., in the chair.

INCIDENTS OF OFFICE PRACTICE.

Dr. E. T. Payne. I have here a model which illustrates a principle that has occupied the attention of the Odontological Society at two or three meetings, more or less. I refer to the premature removal of the temporary cuspid. This model shows the condition of a mouth where the temporary cuspid was removed about eighteen months ago. On the right side will be seen a condition of things which would naturally result in such a case.

On the other side of the mouth the temporary cuspid was allowed to remain, and there the development is perfect.

The patient is eleven now, and the permanent tooth is nearly ready to take its place in the arch, but as will be seen by the model the space is largely occupied by the lateral incisor and the first bicuspid.

Dr. Kingsley. That model gives me an excellent introduction. As Dr. Payne says, we have had this subject before us several times during the past year, and some months ago I made some statements in discussing it that were decidedly pronounced. I hardly think anybody would mistake what I had to say, and I think I was a little severe on Dr. Clowes. We were at issue on this very matter. Dr. Clowes gave an order or arrangement of the shedding of the first set of teeth and the eruption of the second set that seemed so at variance with my reading and observation, and with the observation of most of my fellow-practitioners, that we all of us felt that following the course indicated by Dr. Clowes would certainly end in trouble. The model brought here to-night would seem to prove that idea; and yet, gentlemen, strange as it is, every patient that I have seen since last spring, where I have had the opportunity of watching the development of the teeth, has presented to me this strange peculiarity: the lower teeth had been shed and the permanent teeth erupted in exactly the order stated by Dr. Clowes, and in every case of that kind the upper teeth were shed and erupted according to the order given by me. And now the question is, Is it possible that every single case that I have seen during this time is an exception to the rule? Is it possible that all the books are wrong, or that none of the writers on that subject have ever seen such an order of eruption in the lower jaw?

The President. Will Dr. Kingsley state the order of eruption given by Dr. Clowes?

Dr. Kingsley. It came up in this way: Dr. Clowes, in referring to the method of treating irregularities, etc., referred to the eruption of the central incisors as the first teeth of the second set to make their appearance. If he did not see room enough for them to appear, he did not hesitate to extract the temporary laterals, and when the lateral incisors appeared pointing through the gum, if there was not space enough between the permanent centrals and the temporary cuspid, he did not hesitate to extract the temporary cuspid, and then when the permanent cuspid came pointing through he would extract the first temporary molar to make room for it, following in that order until the second bicuspid should make its appearance in place of the second temporary molar, and if he found there was not room for it he would extract the first permanent molar.

In other words, he began at the center and kept extracting until he got back to the sides of the mouth. I took issue with him, the issue being that after the eruption of the incisors came the shedding of the temporary molars, and *lastly* the shedding of the temporary cuspids and the eruption of the permanent ones; and I said that the course pursued by Dr. Clowes would inevitably, as a rule, end in finding the permanent cuspid coming outside of the line of the dental arch, with the permanent lateral and bicuspid nearly in contact; and that it was the course above all others that would create an irregularity. What I then said applies to the upper jaw almost universally, and I believe is just as much a scientific truth as any truth in science. It applies to the upper jaw, but to my astonishment it does not apply with equal universality to the lower jaw. I have seen almost every day for months past some child whose mouth presented, in the lower jaw, exactly the order of eruption claimed by Dr. Clowes, while in the upper jaw exactly the order I have described was shown. In all these cases the cuspids of the lower jaw were pointing through the gum next after the incisors were erupted, and coming before the shedding of the temporary molars, while in the upper jaw of the same mouths the other order was being carried out. I have said to myself how could I stand up before a body of intelligent men and speak so positively, and not a soul in the audience correct me? Is it possible that all these cases that I have seen during the past six months are exceptional cases? I cannot believe it. I wish to do Dr. Clowes the justice he is entitled to after I have spoken so critically about his remarks, and to say that *he* might have been looking at the lower jaw when *I* was looking at the upper one.

Dr. Brockway. The two sides of the same shield.

Dr. Clowes. Among my remarks, found in the DENTAL COSMOS for December, a desire is expressed that no one should commit a blunder in my name. The plaster model which I hold in my hand seems to have been presented for the purpose of disproving the correctness of my theory and practice in the matter of regulating teeth. Some one blundered when this temporary cuspid on the right was removed, because its extraction was unnecessary. Had it been necessary there would still have been a blunder, because its mate on the left was not removed at the same time. *The rule is both or none.*

The President. Would you not then have had trouble on both sides instead of on one only as now?

Dr. Clowes. If needlessly done, yes; if judiciously, no.

Dr. Benjamin Lord. Dr. Clowes says he does not think there was any necessity for extracting the temporary cuspid, but if there was a necessity for it the other one should have been extracted also. Are we to understand that if there was necessity for extracting one, the other should have been extracted whether there was any necessity for it or not?

Dr. Clowes. You must extract both teeth at the same sitting.

How often has it happened (when only a part instead of the whole of the sixth-year molars have been removed) that the result proved unsatisfactory, and thus led to an unjust condemnation of the practice? A dentist should be equal to his calling—which is one of the highest—and do right.

Dr. W. C. Barrett. It is a great pleasure for me to meet with you this evening, as you can readily appreciate. I do not know that I have anything of special importance to present, for I have not prepared or thought of anything. It was my intention to go home to-day, but I staid over another day in order to be able to meet with you this evening. A case does come to my mind, however, which has troubled me somewhat, the outcome of which I have not yet seen. A week ago last Sunday I was called in consultation with a physician and a surgeon in Buffalo, in regard to a case, the history of which I will briefly give. Five or six months previous the patient, a lady, had a first molar extracted, and from that time on she had constant pain, which kept increasing up to the time I saw her. The physicians had done all they could. Finally they found that the socket of the extracted tooth had never closed up at all. The lady suffered the most extreme and excruciating pain. I could not discover any external trouble. I explored with a probe to determine if there was a root there. The examination convinced me there was not. I did not do anything further that day. She came afterwards, the surgeon with her, and we made a further examination and exploration, and found there was a cavity which extended up some distance into the bony process. In the meantime the pain had increased for two or three days to such an extent that the night before, as they told me, her mind was wandering; she was apparently deranged from nothing but the excruciating pain she had undergone. There was a little prominence about the place where the second bicuspid had been, and that we might eliminate the possibility of local disturbance, I advised an operation, and made an appointment with the patient and the surgeon for Saturday last. Afterwards I closed up the mouth of the sinus about the point of a syringe, and forced water into the cavity, so that I might determine if there were any opening into the maxillary sinus, but I got no response. The bony walls of the socket seemed to be entirely denuded. Then I thoroughly cauterized the whole surface of the exposed alveolus with undiluted aromatic sulphuric acid, and dismissed her. In the morning the physician sent word that she had been entirely free from pain from that time, and he counseled waiting a little. That was on Sunday morning. You can understand that I am a little anxious to hear what the result has been. If any gentleman present has had anything of a similar character in his practice, I should be glad to have him describe it.

Dr. J. Morgan Howe. I had a case somewhat similar to the one that has just been described. A patient presented a superior lateral incisor with pus discharging around the neck, and very much loosened; there was a great deal of inflammation, and such a condition of the soft tissues as made me decide at once that the tooth could not be saved. I advised taking it out immediately, with the hope that that would end the trouble. It did not, however. Both the pain and suppuration continued. The use of sulphuric acid in this case, which I commenced almost immediately, did, after a long time, have a good effect, so far as to cause the pain to diminish, but it was quite persistent.

President Jarvie. What strength was the acid?

Dr. Howe. It was pure sulphuric acid in about eight parts water. It caused pain at first, but gradually produced an improvement, with some diminution of the discharge of pus. The socket of the tooth, as in the case just described by Dr. Barrett, seemed to be completely denuded of periosteum. It was, I have no doubt, a case of carious bone. I fully expected to make a complete cure by the use of sulphuric acid, and was determined that I would do it, but I failed. The discharge continued, although diminished in quantity, as long as eight weeks. I then told him I should insist upon burring out the carious bone. This had been deferred so long because the gentleman said he had heart-disease,—his physician had so informed him. He could not take an anesthetic, and he was very much afraid of being hurt. I cut out the whole surface of the carious bone, which did not extend very deeply, with a bur, and that was the end of it. There was no more discharge after twelve hours, there was no more pain, and no further treatment was required.

Dr. Bödecker. I would like to ask Dr. Howe whether he means caries or necrosis. The two are entirely different. Caries means inflammatory reaction of the bone itself, while necrosis means death of the bone.

Dr. Howe. Yes, caries and necrosis are very different. I suppose caries means a condition of the bone somewhat similar to an ulcer in the flesh; there is a progressive disintegration of the bone, but there is no sequestrum formed. In necrosis there is death of a larger or smaller portion of the bone, which sooner or later is separated from the living tissue by a reactionary process in the direction of repair. In caries there is a wasting away of the bone; there is death of a portion of the bony surface, and in the discharges particles of bone can sometimes be found in very minute portions like fine sand. I think caries is a common complication of alveolar abscess; much more frequently seen than necrosis.

President Jarvie. This was a case of caries?

Dr. Howe. I think so.

Dr. J. B. Rich. It is entirely different from the case that Dr. Barrett was describing.

Dr. Howe. Not entirely different, it seems to me. After the extraction of the tooth the socket did not close up, and there was persistent pain, which was hardly relieved by anything I could do, and it continued more or less for a number of weeks, keeping the patient awake nights. There was a roughness of the socket as felt with the probe. In some respects it was quite different, it is true.

Dr. W. H. Atkinson. I suppose I am in some measure responsible for this treatment; and I think it is well for us to understand the principles that govern a case before we attempt to establish a philosophy respecting it. And we are not only crippled because of a lack of correct apprehension, but also because of a want of accurate terms to express the apprehension that we have. There has been too much difference made in our pathological teachings between necrosis and caries. Caries may be said to be a superficial progressive necrosis; and necrosis, as generally understood, is a considerable territory of bone that has been deprived of its circulation. In either caries or necrosis I would use the bur without waiting for the action of any solvent. You had better bur ten times as far as you need to go than fail to go as far as you ought to go. If the least bit of dead material is allowed to remain, it will be a ferment that will keep up this difficulty, and will continually express itself, if in a nerve tract, in the form of neuralgia. One word in regard to the solvent power of sulphuric acid. The dilution that Dr. Howe referred to is just the strength of ordinary elixir vitriol, compound aromatic sulphuric acid, and is not strong enough to dissolve bone, either dead or alive, but the softened bone, just between the dead and the living, it does dissolve beautifully. In the metabolic action for the reproduction of tissue the very same stages of successional changes must be gone through that the original structures went through in their production. If there is any necrosis about the socket of a tooth, you are perfectly safe in burring out the cancellous transverse process, so that you get a clot. You need not even wash it out. If you leave the débris, and let a blood-clot form, it is as good a dressing as you can have. But in a necrotic condition I prefer to use aromatic sulphuric acid in full strength as soon as I have dried out the territory. It cooks the lymph forming the clot that makes this pocket in which the new tissues form. All that is necessary is to keep foreign matter out of it.

Dr. Frank Abbott. I would like to ask Dr. Atkinson if there are any cases where there is a tendency to necrosis or caries of the bone in which he would not use the bur?

Dr. Atkinson. I have seen such. I have an interesting case now where a child of seven years and a few months had been put under an anesthetic, and the right inferior temporary molars and cuspid were extracted (the lateral having been taken out before), and the permanent central with the root about half developed. In this case necrosis was threatened, but I did not bur. From the hands of this dentist—I am glad I do not know who he is—the case got into the hands of a surgeon. There was much swelling under the jaw and all around the face, and the child could not eat, rest, or sleep for pain, and had been in a bad condition for eight or ten days; then the surgeon said it would have to be opened under the chin. Before that was done a friend of the father of the child requested to have it sent to me. It came. I examined the case, and he asked me if it was necessary to cut it open. I said it was not yet necessary, and I hoped it would not be at all. You will remember that at seven years of age the crown of the permanent cuspid is already formed, and might be injured by the bur. I invite the gentlemen present who may wish to do so to come and see this case at my office any morning at half-past nine. You may learn more by looking at it and having five minutes' talk, because you will get your own perceptions of the case without having to go through my lame language to get at the conception.

Dr. S. B. Palmer then read the following paper on the "Harmony of Principles and Practice."

Mr. President, and Gentlemen of the Odontological Society of New York: I wish to thank you for the distinguished honor conferred in the invitation to read a paper upon this occasion, and not less for the opportunity it affords of communicating to you, and through you to the dental world, a few thoughts on science and dental practice. I come not in defense of theories, nor to destroy the pleasure enjoyed in their discussion. Friends and representatives of the profession have asked for a personal statement of my beliefs, insisting that silence gives consent to erroneous notions not consistent with my teachings or office practice. Allow me to say that repeated challenges to journalistic controversy have failed to elicit explanations which this reasonable request prompts me to offer.

To avoid future misunderstandings I present my own views respecting the "Electro-chemical Theory" and the "New Departure," as exemplified in daily practice.

Dental knowledge is obtained by two methods. One is the legal process, where theories are proved by the law of existence, "survival of the fittest," and made to run the gauntlet between "bulls and bears." The other is the scientific method. In either case the practical facts amount to the same. The first named method seems to be a "go as you please" amusement, with license to exalt one side and debase the other. Science ever defends truth: therefore we rarely find a true scientist retained like an attorney upon one side of a disputed question.

The history of dental progress, in the operative department, offers little for the profession to boast of as a scientific body.

The amalgam war is an illustration. The undignified proceedings during its continuance had nothing to do with science, and all discussion since that period leaves many points yet to be determined by scientific investigation.

Again, look at the time and temper lost in discussing various preparations of gold. To say nothing of cylinders, ropes, blocks, and pellets, there are non-cohesive, cohesive, heavy foil, and crystal golds. Instead of asserting that good durable fillings cannot be made with any one of these preparations, we should first learn the fundamental principles or the pre-requisites for a perfect filling. Only two conditions are necessary in about eighty per cent. of adult teeth that require the operation. First, the walls of the cavity, particularly at the margin, must be tolerably smooth, free from deep cuts or scratches, and the edges must not be broken down in packing. Second, the gold must be left in absolute contact with the tooth structure to be preserved. This is all that is required, and simple to understand. Without doubt non-cohesive gold will make the best filling with the least skill. The early operators did good serviceable work with this preparation alone.

Crystal gold when first introduced was very flattering. It required greater skill to use it. Many, having failed to master the true method of manipulation, denounced it as a material for fillings. The correct thing would be to acknowledge self-inability, rather than to challenge operators like Dwinelle and Hodson, who knew how to manipulate it. Probably a combination of non-cohesive and cohesive gold would be the best compromise between average talent and tooth-preservation, but to affirm that superior fillings cannot be made with cohesive gold is contrary to the facts established by the enduring operations of the late Dr. Webb and others. The profession is kept in an effervescent state by judging the ability of others from a selfish stand-point. All arguments against heavy foil would fail to convince Dr. Atkinson that he could not make perfect fillings with it under conditions favoring its use. He knows what has been done with it. Though this knowledge may have cost many failures, he now knows what he *can* do.

It is also unwise to accept upon authority the conclusions of investigators whose experiments are directed against a theory, especially if the doctrines are obscure, and the line of study lies beyond the boundary-line of practice. Time will establish truth and expose error.

The "New Departure" is also a theme for much unprofitable discussion. As I understand it, there is no lack of harmony between the "New Departure" (which received my inglorious endorsement) and the practice of to-day. Let us look at the facts. A few years ago gold was king, and all respectable dentists were loyal subjects. With great timidity I represented gold as incompatible with one condition of dentine. Tin foil was recommended as a mediator.

The *theory*, as it was termed, was highly complimented in the discussion, but was robbed of its glory by a statement that it was wanting in *facts*. We have waited ten years, the facts are all in, and admitted to practice, and I can assure you it is a happy occasion that allows me to point out existing harmony. With no little hesitation I then advised compound fillings of tin and gold to render gold more compatible to dentine. Now we have fibrous tin, amalgam,—yes, amalgam, containing copper, for the same purpose, all used by eminent operators outside of the "New Departure" movement. The practice is good, and in harmony with the principles given. Yet it reminds me of a visit to the "greatest show on earth." A deer was started in the ring, followed by a pack of hounds. The scene was exciting for a time, but presently the object of the chase was overtaken, though unharmed. At times it was lost sight of in the on-moving crowds, while the fleetest hounds in the chase took the lead, barking as furiously as when the game was ahead.

But, seriously, I never claimed more for the principles under consideration than is admitted by the practice of to-day. I wish to show that no such gulf divides the "New Departure" and modern practice, such as many suppose exists. Strange as it may seem, *principles* have seldom been reached in discussion. One of my co-laborers personally, and his "no-gold" plastic practice especially, has received all the time and energy that could be given to the subject. Whoever looks at this matter philosophically cannot fail to see that even these results are natural. Opposition is in accordance with mental magnetism.

Dr. Flagg came not to bring an olive branch, but a sword. In his own words, he said: "Do you suppose it is a new thing for me to be antagonizing accepted dentistry? No, gentlemen, it is no new thing." True to the laws of magnetism, at the moment this long and pointed spark flashed from the positive pole against accepted practice, it was met by one as intense from the highly charged negative pole of accepted dentistry. Since that time it has pleased many to apply the discharger, and enjoy the excitement produced. The object of the "New Departure" movement was to place the much neglected and despised department of plastic fillings upon a scientific basis. To do this required associated labor and the assistance of scientists and metallurgists outside of the profession.

The work has been accomplished and the results published. What is true and practical will be received; what is impractical—if there be anything—will be rejected. On the part of the originator there is no desire to defend the "New Departure," nor to perpetuate it as a new school of dentistry. Indeed, the principles do not abrogate the use of gold, where it can be satisfactorily used, for tooth-preservation. One of the greatest advantages in my own practice is to aid in the use of gold by supplying properties which gold lacks. Thus, we may consider the principles of the "New Departure" as broad as dental practice. Upon this platform Dr. Flagg uses no gold; Dr. Chase and myself use it according to indications.

It may be a surprise to those who have so often quoted Dr. Flagg's opposition to gold to learn that the idea is taken from his *practice*, and not from his own *statements*, first and last. The difference is of no consequence, except that it shows how natural it is to cultivate elements of discord rather than harmony. This is what he said six years ago: "I do not wish to say anything to you of the teeth which you are in the habit of filling successfully, and as we express it, satisfactorily, with gold; teeth of dense structure, whose cavities have walls so strong that you can impact a filling which lasts a lifetime. But I do ask, will you gradually discontinue this packing of gold into teeth that are so poor, so frail, so unsubstantial that it is, to say the least, doubtful whether the result will be creditable to your profession or satisfactory to your patients?"

The following is from a letter dated December 2, the present month:

"Plastics are rapidly asserting their 'power,' and for myself, with my *practice* and *teaching* exclusively pertaining to *soft* or *exquisitely* sensitive bad teeth, I have lost sight entirely of gold as a filling material, *most excellent* though it unquestionably is *in its proper place*."

The above is the sentiment expressed in all correspondence and conversation I have had with Dr. Flagg. I never had occasion to believe him unqualifiedly opposed to gold. A knowledge of this understanding, and a firm belief in the principles upon which the "New Departure" is founded, is my excuse for my adherence. A choice between self-respect and professional standing became imminent. I chose the former, and most philosophically accept the consequences. Within six years the principles have been acknowledged *practically*, and are rapidly gaining *scientific* recognition.

Some object to the prominence given to plastic fillings, upon the ground that the younger members may be led astray, and degrade the profession. We undervalue the intelligence of dental students when we recommend ignorance as a virtue in dental education. Knowledge is power, and plastic fillings a necessity. Degradation is in the *heart* of him who abuses knowledge.

The so-called "Electro-chemical Theory" is another fruitful theme for disparagement. The meaning is that the teeth of children which commence early to decay, and teeth of soft, chalky structure, are acted upon electro-chemically when filled with metallic fillings. Or, in other words, the progress of decay, at first *chemical*, is rendered *electro-chemical* by the addition of a third element, which forms a battery. As I am held responsible for the introduction of this doctrine, I have a desire that the profession know the *facts* relating thereto. I regret to say some facts are antagonistic to statements made by others, and believed to be true. In kindness to opponents, names and personalities will be left out. The following unqualified assertion, since it has been quoted from accepted authority, cannot pass unnoticed without retarding scientific progress and doing injustice to your committee for giving an evening to discuss the offerings of one whose investigations and conclusions end in a theory that is said to exist only in the imagination. The statement is this:

"Tooth-bone being a non-conductor, the electric current never can have any existence except in the imagination."

The above conclusion follows after a long line of carefully conducted experiments made upon *normal* tooth-bone, under circumstances which might possibly warrant the statement, and is well calculated to convey false impressions. Had experiments been made upon *abnormal* bone another fact would have been added which would have made a harmonious whole. I need not give the result of experiments to convince some of you that a tooth in a *normal* condition needs no battery of three cells, nor a delicate galvanometer to detect a current. One fact is sufficient to destroy all assertions to the contrary. An eminent dentist, one who by practice and writing has done much for the profession, in an article *against* this theory, gives two gems of truth. Because they are facts, they become factors and harmonizing elements in the alleged theory. The following quotation is conclusive evidence:

"A filling of gold inserted in one of my teeth, also two of amalgam, over thirty years since, by the late lamented Chapin A. Harris, are still doing duty, and the electric influence is still so great in the gold filling that the close approximation of a tack to its surface presents quite an unpleasant sensation, but nevertheless remains perfect."

Here we have evidence of the conductivity of tooth-bone so dense as to retain a gold filling over thirty years. We also have another fact, which agrees perfectly with all practice, that the current does no harm to teeth of good structure. As this explanation is intended for the last to be given upon this subject, I have great desire that you understand just what the current *does* in promoting decay. I come to you, as Columbus went to the court of Spain, to gain a hearing, believing that here may be found both time and talent to consider points hitherto overlooked. Nature conducts her operations by positive laws. Nothing happens. Change of *conditions* gives different results. Operations in the oral cavity are no exception. A tooth attacked by decay continues on till the conditions are changed to arrest the process.

Filling the cavity is the point now under consideration. If the plug be of gold, as already stated, contact must be perfect. Teeth of average density thus filled are ordinarily preserved from further decay at that point. That is, we all agree that teeth of normal structure may be filled with gold, which, with equal preservation, is by far the best material in use.

We have stated that a tooth filled with metal, under favorable conditions, becomes a battery. This has been denied, and many experiments have been given in proof of the denial. Thus the question remains unsettled simply because the specific conditions are not given in each case. As Milton said, "A good principle not rightly understood may prove as hurtful as a bad." Either the principle is not understood or it has been given in a partisan spirit, so that others do not understand. Thus it becomes hurtful.

To save confusion, let us consider but one point, viz., under what circumstances *does* electro-chemical action favor decay, without special reference to the theories of decay now under discussion. Controversy upon this subject is stimulated by misapplied facts. Without some knowledge of the elementary principles of what constitutes a cell no one can judge correctly, and all are likely to be led by force of argument. For two reasons I will quote Dr. Watt's description of a galvanic battery: 1st. It is simple and comprehensive; 2d. Dr. Watt is known to stand firmly upon a gold basis:

"The essential elements of a galvanic battery are one imperfect and two perfect conductors, or one perfect and two imperfect conductors. The metals, charcoal, and moist animal substances, though differing in conducting power, are called perfect, while water and aqueous solutions are called imperfect conductors. In the battery first described it is essential that the imperfect act chemically on one of the perfect conductors. The voltaic current is the great instrument of chemical decomposition, especially of binary compounds. Galvanic decomposition is called *electrolysis;* a substance which may be thus decomposed is an *electrolyte*, and the terminations of the battery are called electrodes."

With the above definitions, let us apply the principles to a "tooth battery." A filling of metal would be an element, and a perfect conductor. If it were of gold, and properly inserted in a tooth of average density, it would only compare with a battery, where the fluid and zinc elements are removed,—no battery, and no action. This fact has often been given in argument against *all* conditions of tooth-structure. Here we have a fact, supported in practice, that gold fillings do not injure dentine under the conditions above named. Let us change the conditions and observe the results. When a gold filling is *defective*, moisture is present between the plug and the dentine. Then another element, called the imperfect conductor, has been added; the battery is still incomplete, and no current is set in action. *Chemical* action, however, is a positive result, by which the non-conducting constituents of dentine, the lime-salts, are removed, leaving upon the surface the animal portion, which is both a conductor and an electrolyte. Thus the battery is complete and in working order. This condition should stimulate to perfect work, which would obviate the difficulty. There is, however, a condition of dentine that even this precaution fails to overcome: in teeth decidedly below medium in structure, so soft that it becomes difficult to determine the boundary between the decalcified and calcified portions. Let it be remembered that the walls of such cavities present one element already, the plug adds the second, and unless some precaution more than perfect manipulation is taken, moisture will enter through the undeveloped or decalcified dentine, and thus promote the action mentioned. Gutta-percha fillings serve my purpose much the best. By their use time generally allows nature to complete her work. Then the tooth may be filled with gold. Since *practice admits* that tin and amalgam possess antiseptic properties that gold does not, *scientific* reasons may now be received. The carbonate of tin, sulphide of silver, etc., which are the result of chemical action upon the plug, pass into or take the place of the lime in the dentine, thereby destroying the effects on the positive element before waste has left a space between the plug and walls of the cavity.

Like cohesion, this principle acts only at imperceptible distances, and cannot be depended upon to make perfect fillings in poorly prepared cavities. Tin I regard as preferable to amalgam. It makes a good lining in connection with the latter. It imparts less color to the dentine, and the shrinkage seems to be less when so used. My observations of amalgam fillings are that those which do not discolor dentine are best for teeth which could be safely filled with gold, but for the conditions where gold would be objectionable, a lower grade of alloy would be preferable. Or if the higher alloy is to be used, let it be treated in the manner that gold would demand. One argument introduced in the effort to set aside the electro-chemical theory is a fact that tooth-bone, as a whole, is not a conductor of the electric current, therefore not an electrolyte. This agrees with observations in practice, because currents from fillings do not act upon the entire surface, as would be the case were the whole mass polarized. Again, the action or decomposition under the filling is secondary, not primary, as in true electrolysis.

The substance decomposed by primary action pertains to that element in dentine which remains after the non-conducting lime element is dissolved. The dissolving process is the secondary action instituted by direct decomposition of food and fluids, or of the animal portion of the tooth. With one illustration of electro-chemical action in a cavity, I will leave the subject. A boy was brought to my office in great suffering from an inferior molar in which there was a crown cavity. With great difficulty, on account of sensitiveness, I removed the cause. A simple dressing gave relief. The trouble came from the point of a graphite pencil which had been forced into the cavity and broken off. Previous to this slight accident decay in that tooth was *chemical* only; the broken point introintroduced the third element, and practically completed a battery, with local action at work, and the action became *electro-chemical.* This is a principle so generally understood that no scientist will deny it. Had the point been wood, bone, glass, vulcanite, or any other non-conducting material, no such sensitiveness would have occurred, and we would have been without a point for this illustration.

Gentlemen, I have not attempted to offer any principles or practice which is now new. I regret that circumstances demand the repetition of conclusions offered to the profession nearly ten years ago. Then opposition declared the principles a fancy and the facts unknown. Practice, by the slow, impartial method, now recognizes the facts; and before another decade *science* will be received, and harmony restored. We are in possession of all the knowledge and experience of those who have preceded us. We have for office reference "Webb on Gold," and "Flagg on Plastic Fillings," the beginning and end of operative dentistry to the present time. Let us study their teachings, observe the conditions, and prove them in our operations. So shall we honor our profession, exalt our practice, and benefit our patients.

President Jarvie. Gentlemen, the paper is open for discussion now. We shall be very glad to hear from any gentleman present. We naturally enough turn to Dr. Flagg.

Dr. J. Foster Flagg. I did not come here this evening to talk, but merely to be a listener, and to afford myself the pleasure of seeing your familiar faces and taking you by the hand. Nevertheless, I would like to embrace this opportunity of placing myself before this body in the position which I have occupied before those who are more intimately acquainted with my principles and practice. In regard to the statement that I am a no-gold man, I will say that I believe that in all accessible cavities, and in every case of good or medium tooth-structure, gold is unquestionably preferable, and under such circumstances I should use nothing else; but my practice has of late years been gradually growing more and more into a practice almost exclusively on teeth below the medium. Scarcely a tooth comes into my office that is not below the medium structure, and running clear down to the very lowest grades. Under such circumstances I have, while recognizing the principles laid down by Dr. Palmer, been compelled to abandon gold simply because I have abandoned the care of the teeth that require it. I have only taken teeth which it seemed to me, from my past experience, could not be saved with gold. I have had the most satisfactory success in carrying out the principles given by Dr. Palmer, as he says, ten years ago.

Dr. Bödecker. I can heartily indorse many things announced in the very good paper that Dr. Palmer has read, although some of the points stated I do not quite agree with. For instance, in lining cavities I believe that tin is far from the best material to use. If we consider what in these cases (according to my view) induces decay in living teeth, we come to a different conclusion. Where fillings have been placed directly upon the dentine in living teeth, decay very often results from the contact of the metal with the dentine. This induces an inflammatory reaction, and especially where the living matter is present in abundance, which is especially the case at the junction of the dentine and the enamel. If a lining of oxychloride of zinc or oxyphosphate of zinc, or something of that kind is used, this result of the metal filling is obviated to a great extent. Of course, at the junction of the dentine and the enamel we can have no oxyphosphate or oxychloride lining, and probably only a slight covering of a very thin solution of gutta-percha in chloroform, but wherever a cavity is deep enough to admit of the interposing of oxyphosphate or oxychloride, I have always found it the most successful practice. Previous to the introduction of this lining, I would paint the walls of the cavity with a very thin solution of gutta-percha in chloroform, which will protect the living matter of the dentine to a greater extent. I believe I have not in ten years seen half a dozen cases of secondary decay where I have taken this precaution.

Dr. Palmer. My paper was not designed to give anything new, but merely to re-state the theory which was given to the profession nearly ten years ago. We have progressed since then. I am glad of the harmony existing between the principles as then stated and present practice.

Dr. Flagg. That idea of lining cavities with oxychloride of zinc is, I believe, twenty-two or twenty-three years old this year. I think you will find in the transactions of the Pennsylvania Association of Dental Surgeons of 1859 and 1861 the whole subject of lining cavities with oxychloride of zinc discussed, and it has been largely practiced since then.

Dr. Clowes. A case came under my observation recently that may be of some interest. While making a professional examination for a lady patient I came unexpectedly upon a curious approximal cavity in one of her teeth. Its location was cervico-gummal, at a point of wide separation between two upper bicuspids. As separation with me generally means safety, I wondered at what I saw. It seemed as though a thing of life, with rodent propensities, had been actively at work. I questioned the lady as to any habit she might have in reference to that part of her mouth. I told her I once had a patient who having learned to chew tobacco for dental preservation, was disappointed because where he carried his quid decay was greater than anywhere else in his mouth. She replied, "I don't chew tobacco." "Of course not; but may I ask where the caramels, the lemon-drops, the sugar-plums have their favorite resting-place?" She disclaimed harboring any of those things. But as every consequence must have a cause, I asked her to help me find it. After thinking for awhile she said, "I very often carry my gold shawl-pin between those teeth; might that be a cause?" I could not say, but promised to inquire of Dr. Palmer about it this evening. *Was not electro-chemical action somehow produced by that pin immersed in the intervening fluids of the mouth*, and hence the decay? I think it was, and trust our friend can explain it.

Dr. Palmer. I can hardly think that the shawl-pin could have had that effect. I can see that it might spread the teeth apart, and enlarge the space between them, but it seems to me that we would hardly be justified in jumping to the conclusion that it had done the mischief there. If it had been a loose piece of gold, and a long time in there, we could see how it would work mischief, but a shawl-pin, I think, would require to be carried there more than anyone would be likely to carry it in order to occasion other than mechanical disturbance. The injury was probably from mechanical causes.

Dr. Clowes. You know ladies carry pins in their mouth while sewing. I could account for this decay in no other way than through some chemical or electrical action.

Dr. S. G. Perry. Dr. Palmer, in his paper, spoke of lining amalgam fillings with tin foil. Will he have the kindness to describe his method, stating how much tin foil he uses, and in what form? Also whether he has had the opportunity of seeing the effects of copper amalgams, such as Sullivan's cement, which is used largely by the English dentists, and whether he favors their use?

Dr. Palmer. In regard to lining cavities with tin, I had reference to plugs in very large molars. The tin is put in so as not to come up to the enamel surface, but to be burnished against the walls of the cavity, taking the place of some of the amalgam. Then fill with amalgam. The idea is to leave a cushion of tin, which is a better antiseptic than the ordinary amalgams. I quite agree that linings of other preparations possess the same virtue. I was carrying out the principles of the electro-chemical theory. In the use of amalgam for surface, I should prefer to combine oxyphosphate or oxychloride, according to indications. As to the copper amalgam, I do not use any containing over five per cent. of copper. Such amalgam in certain conditions of teeth is much better than those which do not discolor. Those coarse amalgams are now successfully used by many who have been decidedly opposed to the "New Departure" movement. The principles upon which they are founded are good, but I have never tried the copper amalgam.

Dr. Perry. Will Dr. Palmer have the kindness to tell us if he has come to any conclusion in reference to the cause of the shrinkage that we so often see about the edges of amalgam fillings?

Dr. Palmer. As near as I can account for it in my own mind, it is that these amalgams have very little edge-strength, and the first indication of failure is around the margin between the plug and the enamel; the amalgam breaks away, leaving a slight groove, and the chemical action which ensues decomposes both the edge of the filling and the edge of the enamel, leaving a furrow extending around the margin.

Dr. Perry. I would like to ask if Dr. Palmer has observed what some dentists have claimed: that where large amalgam fillings and gold fillings in the same tooth are in contact, the amalgam fillings seem to have a greater preservative effect upon the tooth? It is claimed that in such cases the amalgam becomes of a darker color, and the tooth is better preserved than it would have been had the amalgam filling stood alone.

Dr. Palmer. That is very true. The effect is the same as in amalgams composed of metals which tarnish. The metallic compound takes the place of the decomposed mineral portion of dentine.

Dr. Perry. I have long been of the opinion that such combined fillings do preserve the teeth better, and I have in some cases cut away an intervening partition of tooth-structure in order to bring the gold and the amalgam fillings together.

Dr. Palmer. That is my practice. When fillings come within the thickness of a dime of each other it is much better to connect them; it destroys the electrical action. When they are separated any good conductor will connect the fillings and produce a shock. It is a principle of electricity that a gold filling and a metal filling of another kind in the mouth are positively and negatively charged. There is a shock whenever such fillings are connected and disconnected, but when permanently joined together that is avoided. Anything brought against either does not injure the other, therefore I say by all means connect such fillings when they are so near as to be connected by food or metal tooth-pick.

Dr. Rich. In regard to the condition of two metallic fillings where there is a thin septum of bone between them, the tooth would be better preserved by removing the septum of bone and joining the surfaces of the fillings. With the knowledge we now have no opinion can beformed as to the advisability of having the surface of an amalgam and a gold filling brought into contact for the purpose of preserving the tooth. It would require a long series of carefully-conducted experiments to ascertain if the desired result could be obtained by such means.

Dr. Perry. When you have for years suspected that there is an advantage in combining gold and amalgam in the same tooth, and you have found confirmation of that suspicion by seeing many cases where there seemed to be a marked improvement in the preservative qualities of amalgam fillings under these conditions, how can you help but feel that you are getting hold of a scientific suspicion that is worth consideration at least? I have never felt that I had quite hold of the fact, yet I have never felt so nearly assured that it was a fact as since the reading of Dr. Palmer's paper to-night.

Dr. Palmer. Science will bear you out in that principle. I am very careful not to advance new theories at this time.

Dr. Perry. Dr. Darby first called my attention to this matter quite a number of years ago, and I have since seen so many cases pointing in the direction of this theory that I think I have pretty good reason for believing it.

Dr. Clowes. I believe amalgam and gold are always in harmony when together in the cavity of a tooth.

Dr. Rich. Of the many causes of the failure of large amalgum fillings of a certain class, there is one I wish to call attention to this evening. The results of this cause are developed in cases where the cavity filled occupies a large part of the masticating surface, and extends down over the whole or a large portion of one of the sides down to or near the gum. This description indicates that the cavity is a large one, and in such cases the tooth-bone is generally of poor quality, and the failure is first manifested at the external portion of the cervical wall.

Fillings placed in such cavities are generally constructed in violation of the laws of dynamics, particularly where there has been an endeavor to so shape the filling that the original form of the tooth would be reproduced, and the plane of the grinding surface of the filling be at a right angle with the side down which it extends. With this form all the force that is applied to that half of the masticating surface of the filling nearest to the surface that extends down the side, would be exerted to tip the filling out of the cavity, and would also transmit the force through the hard substance of which it is composed to the external part of the cervical wall of the cavity, which, not being by many degrees so hard as the filling, must give way under the repeated blows it receives, and be reduced to powder by the crushing force thus continually applied to it. In this manner that part of the margin of the cavity is destroyed.

To avoid such disasters cavities of this character should be so shaped, and the fillings so constructed, that the form of the surface of the filling would direct the dynamic force applied to it to the strongest part of the bottom of the cavity, and be so arranged that it could not be used as a lever to tip the filling outwards. To produce this result all external surfaces of such fillings should be inclined planes, inclining in the direction of the gum.

President Jarvie. We have Dr. Straw, from Newburg, with us this evening. We do not often have the pleasure of seeing him at our meetings. Perhaps he will give us some light on this subject.

Dr. Straw. I am so well pleased to be in such good company that I feel satisfied with that; and as I have not a great deal to say upon this subject, or any other, at this time, or any other time, I shall beg to be excused. I said years ago, and have got done talking about it almost, that if you want to save imperfectly calcified teeth with anything under heaven, put tin against the cervical walls and gold on top of that, and it will save them.

Dr. W. H. Atkinson. I feel encouraged (by the evidence of ability manifested by Dr. Palmer in the paper) to ask a question or two in the direction of the words we use so frequently, "chemical action," "galvanic action," "inflammatory action." What the effect of either is? What he means by "chemical action," and what he means by "electrical action?" Whether they can possibly act separately? Whether they are not both modes of energy that disturb the other mode of energy that builds the teeth? Whether it be molecular changes that induce the disintegration? And whether we have advanced toward understanding the real principles of these molecular changes when we say electrical action or chemical action?

Dr. Palmer. When investigation runs into this field there are many things we do not know, or that *I* do not know; but I will say that the distinction I make in general is this: if we have two substances like a liquid solution with a salt put in it, we get chemical action; and what I meant by electrical action is produced by the addition of a third element which creates, or is the means of producing, what we call a battery, and by the current so established the binary compound will be decomposed more rapidly than it would be by the process of chemical action if there were but two substances in contact. When you have two elements chemical action may go on; add a third and it promotes that which we call electrical action. This is shown by the fact that when you withdraw the zinc from a battery the fluid lasts longer. I cannot now make a distinction between the forces developed, or define the law of electricity and the law of chemical action. The points you ask about are almost like asking what is electricity.

Dr. Atkinson. I asked the questions in order to enable us to determine for ourselves the extent of our own understanding of the processes so variously named, and to correctly represent the degrees of mental conviction we attain by observation of cases in the best terms at command—just as we do not yet know what decay is, or whether it is ever possible to have decay without chemical action, or whether it is possible to have chemical action without an electrical current; and I doubt whether they can act separately. All these currents or movements are engaged in building and unbuilding the substance we daily spend our time upon, and when we see a tooth decaying or falling apart, if we can replace the disrupted part with a material that has a conductivity of thermal and electrical currents in nearly the same ratio as the tooth-substance itself, then we feel sure that we have saved the tooth.

Dr. Palmer. Your explanation is better than mine. I accept it as right, so far as I am concerned.

Dr. Barrett. It seems to me that there have been wonderful misapprehensions in dealing with this subject. When we intelligently consider the correlations of the so-called forces we shall cease to elevate one of the phenomena attending molecular changes into a primary cause. Electricity is not an entity; it is one of the results of molecular changes which may occur in the mouth, or wherever there is a change in the so-called affinities of chemical constituents. Light, heat, electricity, are but different manifestations of the same force. Wherever there are molecular or other changes in matter, there some one or more forms of force are eliminated. In the putrefaction of food in the mouth these changes are active, and are accompanied with the usual evolutions of force. It may be manifest as electricity, but it is only one of the phenomena that always accompany these changes. To consider this result of the changes as an entity, as a something apart from that of which it is the mere result, to elevate it into a prime cause of that of which it is itself the result, to found a rule of practice upon a mere attendant circumstance, seems to me a curious confounding of principles, a singular misunderstanding of cause and effect. In the battery-cell we see the molecular changes which we call chemical transformed into electricity. The electric light is a familiar illustration of the change of this into light, and in the electro-cautery its transformation into heat. In the mouth the same changes are manifest as electricity, but this is only one of the phenomena that accompany these changes. To call this an exciting cause of these changes, to consider it as an entity, a producer, seems to me like studying the vastness, the illimitability of the little rill that trickles down the hill, when the whole broad ocean lies at our feet. I cannot consider electrical currents in the mouth of any more significance than heat. It *is* heat in another form. Both *must* be consequent upon previous molecular changes, and are therefore but accompanying phenomena. When I attempt a "New Departure" in practice it shall be based upon something more than effects, it shall have a broader foundation than the results of something that must have preceded it. I honor the men who intelligently study symptoms, but I cannot agree with him who doctors symptoms only.

Dr. Atkinson. That is just the difficulty that stands in the way of our apprehending these points, and being masters of the situation. There has been a power that builded the structure under a certain set of circumstances that we call heredity, and the physicists say environment does the work. I am very glad to hear Dr. Barrett say electricity was not a cause, but that though it was an antecedent of other actions, it was not identical with the cause. There lies just the point that we must fathom before we will be masters of the situation; and I say give children all the exercise they will take, and let them chew hard substances, if you want them to have sound teeth. The point is *use* is essential to the perfection of every factor of function. "Ubi irritatio ibi fluxis,"—where the irritation is there is the flow. If the food of children is soft it fails to promote a proper development of the jaws and teeth, and lays the foundation for their decay.

Adjourned.

VERMONT STATE BOARD OF DENTAL EXAMINERS.

The Vermont State Board of Dental Examiners will hold their second annual meeting, at the Welden House, St. Albans, Vt., Wednesday, March 19, 1884, at 10 A. M. Applicants for license are requested to report promptly at thattime. No license will be issued during the session of the Vermont State Dental Society. As this will be the only meeting of the board this year, dentists are requested to notify all who intend to go before the board.

R. M. Chase, *Secretary Board of Examiners,*
Bethel, Vt.

ALABAMA DENTAL ASSOCIATION.

The sixteenth annual meeting of the Alabama Dental Association will held at Birmingham, Alabama, April 8, 1884. All are cordially invited, and an interesting session may be expected.

E. Wagner, D.D.S., *Secretary,*
P. O. Box 322, Montgomery, Ala.

DENTAL COLLEGE, UNIVERSITY OF MICHIGAN.

The fifth annual meeting of the Alumni Association of the Dental College, University of Michigan, will be held in the parlors of the St. James Hotel, Ann Arbor, Mich., Tuesday evening, March 25, 1884, at 7.30 P.M. Every alumnus is earnestly requested to be present. Members will please notify the secretary as soon as possible whether they will be present or not. Commencement exercises of dental department will be held at 2 o'clock, March 26, 1884.

R. A. Young, *Secretary.*

BRITISH SCIENTIFIC ASSOCIATION.

I presume the dental profession of America are well aware that it is the intention of the British Scientific Association to hold their next annual meeting in Montreal in August, and afterwards to visit the States. As the association includes within it many of the most prominent dentists of the United Kingdom, would it not be well during their visit for their professional brethren in the States to hold either in New York city or Boston a large dental conference, and thus give an opportunity for the exchange of ideas and the discussion of various questions relating to dentistry. I make this suggestion, hoping that the matter will receive due consideration at the hands of my professional brethren.

H. P. Fernald, D.D.S., L.D.S.

EDITORIAL.

PERMANENT SECTIONS IN THE AMERICAN DENTAL ASSOCIATION.

When the American Dental Association was divided into permanent Sections, it was with the expectation that thereafter its labors would be "more beneficial to the Association and to the profession at large" than under the organization which was displaced. Better results would, it was claimed, be reached by "persistently pursuing scientific inquiries in a single direction than by the present system of preparing papers or essays year after year, and each year on different subjects."

At the last meeting Dr. Atkinson stated that the object, as he understood it, in "forming Sections in the American Dental Association was to so divide the work as to get at textual statement of knowledge already attained; and to get at better methods of investigation of the underlying principles out of which to evolve matters as yet unknown."

In these two statements we have clearly expressed the hope of those who advocated the change from the old organization to the new. It was an attempt to evolve order out of disorder; to substitute methodical procedures in lieu of desultory efforts. The Association had done a great work, but the time had arrived when it must prove its claim to first position by leading the way in scientific research. In this direction it had worked at haphazard, so to speak, —without definite modes of attaining its objects. The new scheme was to divide the work, and by persistently pursuing scientific inquiries in a single direction to attain results not otherwise possible.

It would seem that expectation of steady progress in every department of dentistry was reasonably based on such a plan, which comprehended the concentration of the efforts of many workers upon the unsolved problems assigned to each Section. Yet after five years we find the proceedings as full of crudities as ever, and in spite of the apparently perfect machinery elaborated, progress is not what was expected. The report of the Section on Literature and Nomenclature presented at the last meeting is a conspicuous example.

Omitting the introductory and the concluding paragraph, we present the body of the paper as a notable specimen of how not to do it:

> "In the art and science of the dental profession there are many *distinctive* names and phrases. For the most part, perhaps, these are well chosen, and as expressive as is possible in the present state of our language. There are, however, quite a number of nominations of very questionable propriety. To a few of these we now propose to call attention.
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> The different teeth have different names,—some of these sufficiently distinctive,

as for example, the incisors, the molars, the bicuspids, the cuspids, etc. To some of them, however, names are frequently given which are of doubtful propriety. For example, the cuspid teeth, both superior and inferior, are often called *canine* teeth; this simply because they approximate the form of the dog's tooth. This is certainly a very faulty basis for a distinctive name, inasmuch as many other animals have teeth of a very similar form,—indeed, quite as pointed as those of the dog. The word cuspid means a point, and when applied to a tooth means a pointed tooth. No other word can better designate this tooth. These teeth are also sometimes called "eye-teeth," as applied to the superior, and "stomach-teeth," as applied to the inferior. These appellations are wholly unwarranted by the forms of the teeth, or by any relation they have to the parts referred to in these names.

The FIRST PERMANENT molar is often called the "sixth-year" molar and sometimes the "six-year-old" molar, the latter being a crude expression that no one of just taste would tolerate for a moment. The ground of this nomination is the fact that this tooth is usually erupted when its possessor is about six years of age. The inappropriateness of this name is apparent from the fact that the tooth may appear at any time from five and a half to seven years of age, and in some instances even later.

The name as used would seem to indicate the age of the tooth rather than that of the possessor. There is no more propriety in thus designating these teeth than in calling the second molar the "twelfth-year" molar, or the third molar the "eighteenth-year" molar, or in naming the bicuspids according to the years of their eruption. The appellation "first permanent molar" is clear and distinct, and cannot apply to any other tooth; let this, then, be the name by which this tooth shall be designated. The third molar is known by several names. Some think it entitled to the Latin name, and hence call it "dens-sapientiæ," and others are content with the same name in English, and call it the "wisdom-tooth." The better and more distinctive name, however, is the third molar; this is clear and understandable by all, and is quite sufficient for its designation. The multiplicity of names always tends to confusion.

That part of the teeth resting in the alveolus and by which the attachment is made is denominated the "root" and the "fang." The latter name was in far more common use some years ago than now; one of these names is quite sufficient to designate this part of the tooth, and the word "root" is certainly more appropriate than the word "fang." None could be mistaken by this application of this word, while "fang" is more appropriately applied to the sharp-pointed body that protrudes from a socket or base. Nothing is gained in any respect by the use of these two words to designate that part of the tooth by which it is attached to the jaw. Let the word "root" then be adopted for this designation to the exclusion of the word "fang."

Having heard the anterior root of a lower molar defined as the mesial root, and not being able to appreciate the sense of such a definition, it is proposed here to bring before the Association the terms "mesial" and "distal," in order to get a true definition and the proper use of these terms.

MESIAL, Greek *mesos*, middle; anatomical definition ("Medical Lexicons"), an imaginary plane dividing the head, neck, and trunk into similar halves, towards right or left; every aspect towards this plane is mesial, and every aspect towards right or left is lateral, every lateral aspect being either dextral or sinistral. In the human subject the teeth are arranged around the margins of the jaws in a parabolic curve, or approximating it, and on this account special names have been applied to various surfaces with reference to front, back, or sides, in order to indicate the position occupied by the teeth and their relation to definite terms universally made use of by anatomists, to-wit., median anterior and posterior. It is therefore correct to designate the approximating surfaces of the central incisors as the mesial surfaces, because the position occupied by them fulfills the concept we have, that if the median line passes between them the surface looking towards this line is the mesial surface, the labial surface representing the anterior, and the lingual the posterior surface of a central incisor. But, as before stated, the maxillary arch forms a parabolic curve; hence, it stands to reason that when this term is applied to a bicuspid the position of surfaces changes entirely—that is, if the same nomenclature is employed, the surface that was properly designated mesial in the incisors becomes an anterior surface in the bicuspid, in either the upper or lower maxillary, and what was denominated anterior and posterior in relation to the median line must now either be defined as labial and lingual; or, if you will,—carrying out the meaning of the word mesial,—designate the lingual surface as the mesial; for it is the one surface that looks towards the median line.

DENTINE.—The word dentine has been long in common use, to designate that part of the tooth constituting its body, which is found beneath the enamel and the cement. Perhaps no better term than this can be found. The word "dentos" has been suggested as a substitute for the word dentine, but why the change should be made we do not readily see. The word dentos may be appropriately used as a name for the bony covering of the dentine of the root of the tooth. This material is usually denominated the cement or cementum; both meaning the same thing, cementum being the Latin form of the word, cement the English. This outer portion of the root of the tooth partakes much more nearly of the structural character of bone than of dentine, and may with propriety be denominated dentos. This word would be far better restricted in its application to this part of the tooth. Dr. Chase, of St. Louis, some years ago suggested the use of this name. However he may have intended, it has been used by many as designating the hard structures of the teeth and by some the dentine merely. This word is an illustration of certain cases in which it seems better to use the word of another language. The cases in which this is necessary are few and the number should be lessened whenever practicable.

TOOTH-PULP—The soft, highly-organized body occupying the central portion of every tooth is frequently called the "nerve" of the tooth. Many of our best writers, from custom or habit rather than from a proper application of this name, have used it. It has perhaps received this nomination because of its extreme sensitiveness when exposed to external contact; but the inappropriateness of the term is apparent when we remember that only a very small part of this body constitutes the actual nerve-tissue. It is made up of a small portion of membranous and fibrous tissue, of a large amount of fluid or semi-fluid, veins and arteries, together with a small amount of nerve-tissue. There is no more propriety in denominating this body a nerve than in so designating any other highly sensitive and finely organized tissue or part of the body. The eye as a whole, for instance, may be as properly designated a nerve. The word nerve as applied to this tissue is to the student at least misleading. This structure has sometimes, very inappropriately, been called the lining membrane of the tooth, and hence some writers in former years spoke of destroying or removing the lining membrane, evidently meaning the pulp of the tooth. The word "pulp" or "tooth-pulp" is sufficiently distinctive and understandable and could not be mistaken for anything else, and would convey more nearly the idea of the structural character of the tissue. It has been suggested that the use of this name might also indicate that pulp-mass from which the tooth grows. This is readily distinguishable, however, by the word "embryo." Is it not proper and desirable therefore to designate this soft tissue as the "pulp" rather than the "nerve?"

PERIOSTEUM.—This is the usual name given to that thin layer of soft tissue immediately surrounding the root of every tooth. Some have been disposed to use the word "periodontium." For such a change we really perceive no valid reason; this tissue of course surrounds the dentine, but is not in contact with it, the cement or dentos intervening, which in structure is more nearly allied to bone than the dentine, and it is in actual contact with the former and not with the latter. If the desire is to be very definite and indicate that this structure is about the teeth rather than some other bone, let the qualifying word "dental" be adopted. The phrase "dental periosteum" is as easily spoken and really more distinctive and more euphonious than the word periodontium. When we spoke of an inflamed condition of this tissue, in conformity with this we would say periostitis instead of periodontitis.

MECHANICAL DENTISTRY.—This phrase has long been used to designate that part of dental science and art which has to do with the manufacture and insertion of artificial teeth and all that pertains to it. So far as the needs of mechanical skill are concerned this name may be sufficiently distinctive, but it is not sufficiently extended in its reach. Some may execute well in a mechanical aspect, and yet signally fail in the production and application of substitutes for lost teeth and the restoration of adjacent parts. The name that will embrace both these ideas, namely, that of mechanism and of art, that shall enable the *application* of it to the parts here indicated, is that which should be employed, and in a search of some extent, no better term occurs for this name than "dental prosthesis." Some have been disposed to change the form of the phrase to "prosthetic dentistry." The other is a better phrase, we think. This nomination is slowly but surely making its way in the literature of our profession. It will probably be used ere long to the exclusion of the phrase "mechanical dentistry."

OPERATIVE DENTISTRY.—This name or phrase is usually employed and properly so to designate operations upon the natural teeth for their preservation, or rescuing them from the ravages of disease. It embraces operations upon and treatment of the natural teeth, and is sufficiently clear and distinctive. There has been a little disposition in some quarters to drop this name and embrace everything done in the mouth upon both the hard and soft tissues in the name of "oral surgery." This may with great propriety be applied to all operations upon the soft and hard parts in and immediately about the mouth, but the nature of the operations upon the teeth is so different from those performed upon the other parts of the mouth as to justly entitle them to a distinctive name. There is sometimes an effort made to have a name embrace too much, and this would seem to be a case of that kind.

The first criticism to which this report is entitled is its incompleteness. We are aware that it proposed to call attention to only a few of the "nominations of questionable propriety; but after "persistently pursuing scientific inquiries in the single direction" of nomenclature for five years, the report should have been a full "textual statement of the knowledge attained;" for it is to be remembered that this is the first practical attempt which the Section has made to reform dental nomenclature. The fact is not overlooked that reports on nomenclature stamped with the approval of this Section were presented at the four previous meetings; but the want of appropriateness in these utterances was asserted by the association when it called a halt on their continuance, on the ground that they were "foreign to the purpose of the Section."

The language of the report is in many cases very faulty in construction, as, for instance, "no better term occurs for this *name* than dental prosthesis;" "it has been suggested that *the use of* this name might also indicate that pulp mass from which the tooth grows;" "but the inappropriateness of the term (nerve) is apparent when we remember that only a very small part of this body (the pulp) constitutes the actual nerve-tissue,"—meaning, doubtless, that the actual nerve-tissue constitutes only a very small part of the pulp. Other instances equally glaring might be cited in illustration of the carelessness displayed in the use of language—carelessness which might be excused in extempore speech, but which is unpardonable in a report for which a year's preparation was allowed, and which was to be presented as the formal expression of the Section on Literature and Nomenclature to the highest representative body of the profession.

In addition to the general faults of incompleteness and inaccuracy, there are special objections to the report. In several of the matters it touches upon it teaches false doctrine.

For instance, after suggesting the substitution of "dentos" for "cement" or "cementum," it urges the retention of "periosteum," in preference to "periodontium," to designate the thin layer of soft tissue which invests the root of the tooth, ignoring the wide use to which "pericementum" has attained. If "cement" or "cementum" properly designates the "bony covering of the dentine of the root," there can be no valid reason why "pericementum" should not be adopted to the exclusion of "periosteum." The objection to "dental periosteum" is that besides being inaccurate it is unnecessarily cumbersome.

In an effort to get rid of the term "mechanical dentistry," the report suggests the use of "dental prosthesis," and claims the superiority of this phrase over "prosthetic dentistry." In the next paragraph the propriety of retaining "operative dentistry" is urged. Surely, if "operative dentistry" is the proper form of the phrase for designating one great department, "prosthetic dentistry" is the correct antithet. "Dental prosthesis" and "operative dentistry" is an incongruity. "Dental prosthesis" and "dental operations" would be quite as euphonious.

Again, after proposing to bring before the association the terms "mesial" and "distal" in order to get their true definition and proper use, the report discusses "mesial" at some length, but gives never another word to "distal."

Several suggestions in the report are entitled to immediate and universal adoption, and it is strange that such elementary teaching is necessary at this day; as, for instance, the avoidance of the terms "canine," "eye-teeth," "stomach-teeth," to indicate the cuspids; "fang" for root, and "nerve" for pulp.

Enough has been written to show that the matter of the report was not so carefully considered as its importance demanded. We have used it merely as an illustration to enforce the point that the Sections fail, as a rule, to do the work which a reasonable expectation demands of them. The cause for this failure is to be found in the fact that what is presented as the report of the Section is usually the work of one man, not of the whole Section. Too often it is hastily and carelessly prepared, adopted by the Section without due consideration, and presented with its indorsement to the association.

This is not as it should be. The organization of the Sections contemplated a division of the labor. A plan of action which ought to afford satisfactory results would be for every chairman to assign to each member of his Section a specific duty—the investigation of a certain portion of the assigned work and the preparation of memoranda embodying his researches. These memoranda should be forwarded to the chairman at least a month before the meeting of the association, to give him an opportunity either to prepare a report for the Section or to so arrange the matter forwarded to him for ready consideration by the Section that the preparation of a report would require but little time.

Such a division of the labor would be beneficial in every way. Each member to whom a fixed duty was delegated would feel that in his province the value of the report depended on his work, and he would therefore take pride in doing it well, and thus the value of the reports would be greatly enhanced. If some such organized effort has not been already inaugurated it should be set on foot at once. There are yet several months in which to work.

BIBLIOGRAPHICAL.

DENTAL MEDICINE: A Manual of Dental Materia Medica and Therapeutics, for Practitioners and Students. By FERDINAND J. S. GORGAS, A.M., M.D., D.D.S. Philadelphia: P. Blakiston, Son & Co., 1884. Price, cloth, $3.00.

The author of the volume before us, a distinguished teacher and writer, is well and favorably known to his professional brethren in both hemispheres as the editor of "Harris's Principles and Practice of Dental Surgery," "Harris's Dictionary of Medical Terminology, Dental Surgery, and the Collateral Sciences," and as the controlling spirit for many years past of the *American Journal of Dental Science.*

The dental profession has been compelled to consult works on general materia medica and therapeutics. In 1868 Dr. J. W. White published a small volume entitled "Dental Materia Medica," which contained much of real merit, and which for a number of years admirably answered the needs of the dentist. Later, "Elements of Dental Materia Medica and Therapeutics," by J. Stocken, L.D.S., assisted by Thomas Gaddes, was published in London.

The work of Dr. Gorgas may be said to be the first elaborate attempt to supply a want which every practitioner of dentistry has experienced. It contains a large amount of useful information which is not to be found in any other one volume, but we think a different disposition of the material could have been made, which would have made it more convenient for reference.

We have first a definition of subjects and general remarks on the causes of disease, temperament, age, habit, climate, nature of tissues, definition of inflammation, and a brief description of various pathological conditions, with "important points in diagnosing affections of the mouth." This latter is wanting in accuracy and incomplete in detail—as, for instance, the portions which refer to inflammation of the dental periosteum and alveolar abscess. The paragraphs on scurvy, gangrenous stomatitis, dentigerous cysts, pyorrhea alveolaris, and dental caries would, to a student not acquainted with the clinical aspects of these affections, be misleading. In defining gangrenous stomatitis no allusion is made to age, condition, or surroundings. In the description of pyorrhea alveolaris, it is stated that there is "a recession of gums and absorption of alveolar processes, a tendency to hemorrhage," etc. The facts are quite generally the contrary.

These comments are made not in a hypercritical spirit but in the interests of scientific accuracy, and with the hope that in a future edition the author will more accurately define mouth affections, or, which would be still better, omit their definitions entirely.

The indications of the tongue in disease, abbreviations of Latin and English terms, proximate measurements, a table of doses of officinal medicines; poisons, their symptoms and antidotes; the pulse and respiration at various ages; tables of elementary substances and of solubility of chemicals; classification of medicinal substances, and definitions of the classes; and a chapter on the forms in which medicinal substances are employed, occupy eighty-nine pages.

Dental materia medica and therapeutics proper are taken up at the ninetieth page. The various agents enumerated are considered alphabetically—a convenient arrangement for reference. Following about two hundred pages thus devoted, various other subjects are introduced, such as topical remedies, including the hypodermic method, Seaton's blood-letting, leeching, cupping, eruption of the teeth, and electricity as a therapeutic agent.

Following the description, derivatives, medical properties and action, therapeutic uses, doses and dental uses of the agents described, is a dental formulary, an arrangement which we cannot too highly praise. We think the author, in the endeavor to present a large amount of matter in limited space, has sacrificed clearness of description and accuracy of detail. While sympathizing with the author in his effort to present all that is worth knowing in dental medicine in a work of this special character, we regret that various valuable agents have not received attention. We have found no mention of papäin, resorcin, boro-glyceride; chlorides of tin, magnesium, aluminium, and platinum; peroxide of hydrogen, eugenol, chinoline tartrate, iodide of zinc, erigeron, tonga, London paste, Jamaica dogwood, syrup lacto-phosphate of lime, sulphide of calcium, iodo-chloride of zinc, convallaria majalis, Duquesnel's solution of aconitine, proto-iodide of mercury, oleates of various kinds for external application, and other widely-used remedies in the dental pharmacopœia. The germicidal and antiseptic value attributed to various agents, such as alcohol, carbolic acid, chloride of zinc, creasote, salicylic acid, arsenic, thymol, corrosive sublimate, turpentine, menthol, etc., are not in accord with modern experimentation. The alkaloid aconitia is said to be "a sedative poison too powerful for internal use." This is not a fact, as it has been and is now used all over the world in doses of $\frac{1}{240}$ of a grain and upwards. Belladonna is said to have "little or no influence * * * on any of the secretions except causing a peculiar dryness of the mouth and fauces"—a statement open to question, and not in accordance with good authorities. Carbolic acid, "either pure or combined with collodion, is employed for bathing cavities in teeth preparatory to the introduction of the filling-material, for its effect on sensitive or softened dentine and low organisms." Carbolic acid precipitates collodion—hence the combination is utterly useless. The solvent effect of eucalyptus on gutta-percha is not mentioned, nor do we find any reference to the use of gutta-percha dissolved in chloroform as a root-filling, when it is safe to say that one-third to one-half of the dentists in the United States so use it in connection with cones of gutta-percha. Agents for bleaching pulpless teeth are not numerous, and the reference to chromic acid as a bleacher is antiquated and valueless. We do not observe that powdered alum and Labarraque's solution combined are mentioned as bleaching agents, nor is the method of Dr. E. C. Kirk (see DENTAL COSMOS, November, 1882). Without more explicit directions, the student would fail to remove the external stains of nitrate of silver when used on the teeth. The rules for the administration of bromide of ethyl are evidently not intended for the production of anesthesia for the extraction of teeth; if so, the quantity of the agent recommended is too large. In the article on nitrous oxide the observations of Paul Bert and his pupils are not attended to, and thus it fails to furnish information as to the latest researches on the action of this agent. Of chloride of zinc it is said that, "applied to dentine, its superficial action is owing to its soon becoming decomposed."

In conclusion, we must do the author the justice to admit that the volume gives evidence of the expenditure of a large amount of time and labor. The work shows in some portions careful preparation, but other portions are not up to the times. The eager student and the critical practitioner, in search for the latest information, will still have to consult the more elaborate treatises; but the average practitioner will find this a useful book, and we heartily recommend it as a valuable compend of information needed in the practice of dentistry.

We hope that in a future edition the author will omit much of the extraneous matter with which the book is encumbered, and devote the space gained to a more elaborate and scientific treatment of the dental uses of many of the agents which in the present edition are too briefly and incompletely considered. A. W. H.

THE FIELD OF DISEASE: A BOOK OF PREVENTIVE MEDICINE. By BENJAMIN WARD RICHARDSON, M.D., LL.D., F.R.S. Octavo, 729 pp. Philadelphia: Henry C. Lea's Son & Co. Price, cloth, $4.00; leather, $5.00.

The volume before us is the result of a laborious effort of its distinguished author to place before the intelligent reading public the leading facts about the diseases of the human family, their causes and prevention. Assuming that every disease is traceable by the acquirement of correct knowledge, and when traceable is largely and effectively preventable, he has endeavored to systematize the preventive part of medical science, so far as that is now known, and to enable every one to apply this knowledge for his own benefit. He treats disease as unity with variety of phenomena, and considers "General Diseases," "Local Diseases," "Diseases from Natural Accident," "Acquired Diseases" (from inorganic and organic poisons; from physical agencies, mechanical and general; from mental agencies, moral, emotional, and habitual), "Origins and Causes of Disease," and "Practical Summary of Preventives of Disease." In fifty-eight chapters, with subdivisions, these topics are treated in a systematic and thorough manner. A careful study of the volume, both by physicians and laymen, would serve to lessen vastly the liability to disease, to obviate suffering, and to lengthen life. The mechanical execution of the book is excellent, and it is printed on heavy toned paper.

A MANUAL OF OBSTETRICS. By A. F. A. KING, M.D. With fifty-nine illustrations. Second Edition. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $2.00.

The author explains that the chief purpose of this book is to present, in an easily intelligible form, such an outline of the rudiments and essentials of obstetric science as may constitute a good groundwork for the student at the beginning of his obstetric studies. It does this, and in a most satisfactory manner, and is as well an excellent book of reference for the practitioner. We know of no better volume of its kind. The publishers' work is worthy of the author's.

A COMPEND OF THE PRACTICE OF MEDICINE. By DANIEL E. HUGHES, M.D. Part II. Philadelphia: P. Blakiston, Son & Co., 1883. Price, cloth, $1.00.

This is the second part of A Compend of Medical Practice, the first part of which received favorable notice in these pages. The two small volumes contain a condensation of the practice of medicine, concise, comprehensive, and at the same time accurate. The arrangement and brevity make them convenient for reference to students and practitioners.

TRANSACTIONS OF THE DENTAL SOCIETY OF THE STATE OF NEW YORK, 1882 and 1883. Rochester, N. Y.: Charles Mann, 1884.

The transactions of the Dental Society of the State of New York, at the fourteenth and fifteenth annual meetings, in 1882 and 1883, are here combined in a thick octavo pamphlet of about 145 pages. The minutes of the proceedings are supplemented with the addresses and papers read before the body, and they can but prove of value to members of the profession generally.

TRANSACTIONS OF THE NEW JERSEY STATE DENTAL SOCIETY, for the years 1881, 1882, and 1883. Newark, N. J.: "Daily Advertiser" Print, 1884.

We have here in a cloth-bound volume of 234 pages, the proceedings for the three years above named of the New Jersey State Dental Society. They appear to have been edited with care, one valuable feature being that the papers and addresses are followed in each instance by copious discussion of the topic on which it treats. Several dentists from other States participated in the clinics and discussions.

DEUTSCHE MONATSSCHRIFT FÜR ZAHNHEILKUNDE.

This periodical, organ of the Society of German Dentists, and successor to the "Vierteljahrsschrift für Zahnheilkunde," ran through twenty-two volumes under the last-named title, and began its second volume as a monthly journal with the year 1884. It has for its contributors the following writers: Drs. Baume, Herbst, von Langsdorff, Mühlreiter, Parreidt, Petermann, Schlenker, Witzel, etc. It contains, besides admirable original compositions, excellent translations from the French, English, American, Italian, and Spanish journals of dentistry.

This monthly journal is published by Arthur Felix, 18 Königsstrasse, Leipzig, at 14 marks per year (with postage added, costing American subscribers about $4.10). Subscribers can procure it through booksellers here and in foreign countries.

THE MEDICAL DIRECTORY OF PHILADELPHIA FOR 1884. Edited by SAMUEL B. HOPPIN, M.D. Philadelphia: P. Blakiston, Son & Co., 1884. Price, $1.50.

This is a valuable compend of information as to hospitals, dispensaries, missions, homes, public institutions, medical societies, colleges, etc., of Philadelphia. It contains condensed information as to quarantine, registration of births, marriages, and deaths, etc., and an alphabetical and street directory of physicians, dentists, and druggists.

PAMPHLETS RECEIVED.

Letters from a Mother to a Mother, on the Formation, Growth, and Care of the Teeth. By the Wife of a Dentist, Mrs. M. W. J. Atlanta, Ga.: Judson & Dunlop, 1883.

Annual Address, delivered before the American Academy of Medicine, at New York, October 10, 1883. By Henry O. Marcy, A.M., M.D., President of the Academy.

"Concerning Records," presented at the second annual meeting of the New England Dental Society, Providence, R. I., October 4, 1883. By Geo. L. Parmele, M.D., D.M.D., of Hartford, Conn.

"Woman:" An Oration delivered before the American Academy of Dental Science, Boston, Mass., November 7, 1883. By Norman W. Kingsley, D.D.S. Boston: Thomas Todd, printer, 1883.

"Closure of the Jaws and its Treatment." From the Transactions of the American Surgical Association, Vol. I., 1883. By J. Ewing Mears, M.D. Philadelphia: Collins, printer, 1883.

Transactions of the Alabama Dental Association, at the meeting held in Montgomery, Ala., April 11, 1883. Montgomery: Barrett & Co., 1884.

HINTS AND QUERIES.

I HAVE a lady patient whose upper teeth are very much discolored. They are perfectly clean, as she is very particular about keeping them well brushed, though the enamel is very dark. Will some one please inform me through the DENTAL COSMOS what method I must pursue to restore them to their natural color?—E. C. B.

THAT Dr. Best may thoroughly understand the case referred to in the January issue of the DENTAL COSMOS ("Hints and Queries"), I will present the facts as they are, and trust they will enable him to furnish the desired imformation, and that his reply may not be based wholly upon "supposition." First, the denture is of vulcanite; second, the patient has neither a chronic, acute, nor mild form of catarrh; third, the surrounding tissues are in a perfectly normal condition and not at any time have they presented the slightest trace of even local irritation. These facts were thoroughly studied before the case was brought to your notice. The first denture made covered the entire palatine surface, coming into close proximity with the "palatine pillars" (Wilson). Assuming the presence of this foreign substance, in direct contact with this delicate and easily-irritated membrane, to be the cause of the existing trouble, the change further noticed was made. This being the present condition of the case, perhaps Dr. Best's views and suggestions would be of timely importance, and might possibly rectify the pathological phenomenon. I made a second plate (spring plate), which is crescent in form, not covering the entire rugæ of the arch, but with no better results than with the first. Would a "metal plate," of the same form as the last, produce any different effect? Why should a cold draft produce any different change in the superficial capillary system, with the plate in or out, as the surface with which it (the draft) comes in contact is the same?

Until Dr. Best can give a "more practical" idea of the change suggested, I do not feel that I would be justified in acting upon his advice.—W. A. WHITE.

MY FIRST FAILURE—WHAT WAS THE CAUSE?—A young lady, seventeen years of age, a brunette of medium size, apparently healthy, called on me to have the first superior molar, left side, extracted. She said it had caused her a great deal of pain for two days, but never ached before. I carefully examined it, then made a critical examination of the rest of her teeth, but could detect no visible cause for the trouble. Her teeth are all *sound*, well formed, and regular, except the superior central incisors, which slightly lap. There is no indication of her dens-sapientiæ, nor is there any unusual anterior or lateral pressure. I diagnosed the case to be inflammation of the periosteum, for which I desired to treat it. She, however, tenaciously insisted on having the tooth out. With the greatest reluctance I finally told her that I would extract it, remarking at the same time that such a procedure partook more of the nature of malpractice than of scientific treatment. I lanced well, grasped the tooth, and after having applied almost double the force, and taken twice the time that I usually do, to my dismay the forceps ploughed through the enamel on each side, and came away leaving the tooth intact. I remarked that it was an unusual case, and asked if I caused her much pain. She said that I did not. I then made another deliberate and exhaustive effort to extract it, grasping so firmly that the forceps did not move,—neither did the tooth. It seemed a veritable dental Gibraltar. Now, why did I fail? Was it a case of entangled roots, Plutarch grooves imbedded, or exostosis? Certainly it was no fault of the patient, who did not flinch, nor was it a lack of strength on my part, as I have more than the average man. Nor was it a want of practical knowledge, for in a practice of more than thirty years, on both sides of the equator, I have successfully administered ether and chloroform to about nine hundred patients, and extracted over fifteen thousand teeth,—often protesting, but generally extracting because they were bad company for good teeth, and detrimental to health. Some of them gave me a hard tug, but never before have I utterly failed to extract. Several of them are still in my possession, with their roots at a right angle with the crown. I have extracted for the strong-jawed Teuton, the burly sons of Erin, the Asiatic, the Indian, the Portuguese, the Spaniard, the Greek, the sturdy Roman, the gigantic African, etc. To be surprised, defeated, and humiliated in a minute by an absolute failure to extract the tooth of a young and tender woman, is, to say the least, annoying.—W. W. MORGAN, *Camden*, *N. J.*

SODIUM CARBONATE AS A MEDICAMENT IN DENTISTRY.—About three years ago a patient presented with an upper bicuspid having a large cavity on the distal and grinding surfaces involving the pulp-chamber. The tooth was remarkable for its natural color, there being not the slightest abnormal discoloration. Upon questioning the patient the following history was obtained: "The tooth had ached a short time previously, and in order to obtain relief from the pain he had applied a small quantity of sodium carbonate in the cavity of decay. Cessation of the pain occurred immediately after the application, and there was no subsequent return of it."

Upon syringing out the cavity and pulp-chamber with hot water, the canals were found to be beautifully clean and free from the usual offensive odor. The roots and cavity were filled without further treatment, and the result has been in every way satisfactory. This case led to the trial of sodium carbonate in a large number of cases, particularly in that class of teeth, principally bicuspids and molars, containing putrescent pulps and the débris of food which fill the operating-room and pollute the fingers and instruments of the operator with a stench indescribable. The results obtained were most gratifying. The method pursued in such cases was to first wash out the cavity thoroughly with water as hot as could be borne, and remove with sharp spoon excavators all soft and carious dentine, enlarge the opening into the pulp-chamber, if necessary, and again wash out with hot water. The cavity is then to be dried with bibulous paper, no attempt being made to prepare or dry the canals at this sitting. A quantity of sodium carbonate, in coarse powder—sufficient to fill the pulp-chamber—is introduced and sealed in position with Fowler's temporary stopping; the case is then dismissed for from two to four days. At the next sitting the cavity is opened and washed out thoroughly with hot water as before, when in nearly all cases the root-canals will be found perfectly clean and absolutely free from any offensive odor whatever; the sodium carbonate having saponified or rendered soluble any solid débris of pulp-tissue which was present, rendering its removal with hot water both easy and complete. The roots and cavity are then prepared and filled finally.

The method of treating these offensive cases, above indicated has been more successful and satisfactory in my hands than any other antiseptic treatment which I have heretofore employed. I have yet to meet the first case of any pericemental inflammation following the sealing up of such a cavity with sodium carbonate, no matter how offensive the character of the root-contents may have been; from which it would appear that the sodium carbonate exerted a sedative influence on the pericemental membrane, or rendered inoperative the irritative action of the putrescent root-contents—possibly both. As to the power of sodium carbonate to devitalize an exposed pulp, I am not able to report now, but hope to do so in the near future, as I am investigating that point at present. I have learned, however, that as a remedy for acute odontalgia from pulpitis without exposure, and as an obtunder of sensitive dentine, its effects are positive and immediate.

The compound referred to above is the normal sodium carbonate, having the formula $Na_2\ CO_3$, commonly called soda crystals or washing soda, and not the bicarbonate, $HNa\ CO_3$, known as baking soda.—E. C. KIRK, D.D.S.

TO THE EDITOR OF THE DENTAL COSMOS:

Some years ago my attention was directed to a deformity that has occasioned more difficulties in treatment than almost any other that falls under the care of dentists. These are cases in which the ramus of the jaw is long, and the angle rather sharp, so that when closing the jaws the lower front teeth are thrown upward and backward, and strike the roof of the mouth behind the roots of the upper front teeth. The chin is thus drawn far back, the upper teeth overhang the lower lip, and the upper lip projects like the eaves of a house, and gives a very disagreeable appearance to the profile.

In 1868 I treated such a case with fair success, without appreciating the causes that produced the deformity. Since then I have had a number of similar cases, and after studying them carefully, I am convinced that when taken in time, they may always be treated with advantageous results. I found that by enlarging the angle of the jaw, that is, rendering it more obtuse, and by diminishing its upward curvature, the chin would be thrown downward and forward, and the body of the jaw be lengthened and in this way the teeth could be brought to close in a normal position. To accomplish this it is necessary to place such an artificial piece in the mouth as will prevent the back teeth from closing together, so that they may remain entirely apart, and the patient be obliged to masticate with and to rest the jaw on the front teeth, and on the inserted artificial piece. When such an appliance is properly adjusted, it will be found that the continuous action of the muscles upon the ramus, and the back part of the body of the jaw will cause those parts to yield, the jaw will assume a more direct line, the chin will be forced downward and forward, and the posterior teeth will gradually approach each other, until at length they may be brought into contact when the mouth is closed.

I have at this time under treatment a young girl who has just passed her fourteenth year, and has now all her teeth. I first saw her about fifteen months ago. At that time, whenever she shut her mouth, the lower cuspids closed behind the upper cuspids, and the lower first and second bicuspids behind the upper first and second bicuspids. On one side the second lower bicuspid closed entirely upon the first upper molar. The lower incisors closed against the gum fully a quarter of an inch behind the upper incisors. By the treatment above mentioned, an entire change has been produced. The lower cuspids and bicuspids now close in front of their respective cuspids and bicuspids, and the lower incisors strike the upper incisors about half way between their cutting edges and the gum.

It is not necessary for me to describe further how the artificial piece should be made, as any dentist who recognizes the principle to be acted upon, will know how to adapt it to each particular case.—F. COAR, D.D.S., *Cologne.*

On the use of Flexible Disks.—When, several years ago, I devised flexible disks for use in the mouth, my object was to be able to employ the dental engine in polishing to a greater extent than was possible with the rigid disks then in use.

Although flexible disks in one form or another, as for example, soft rubber, emery paper, and celluloid, are now in general use, no one so far as I am aware has fully grasped my idea. The disks are used as if they were rigid,—I mean without any appliances to curve them to correspond to the curved surfaces of the teeth. A moment's reflection ought to convince anyone that this is an essential part of the idea. My present object is therefore to describe several of the simple devices which I use for this purpose. This can best be done by referring to the figures which accompany this paper.

Let the instruments have tubular shanks to slip onto the hand-piece of the dental engine, their positions and consequently the curvatures of the disks being regulated by the milled collars in Figs. 1, 2, 3, 4.

Fig. 1.

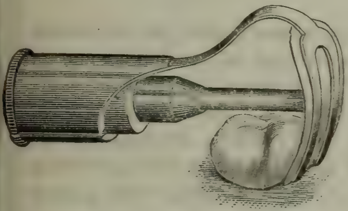
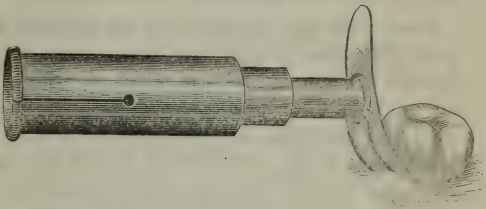


Fig. 2.



Figs. 1 and 2 show what may be called two-pronged fork-benders. They are intended to curve the disks, so that they can be brought against the cervical wall of a contour approximal filling, or against the necks of the teeth.

Fig. 3.

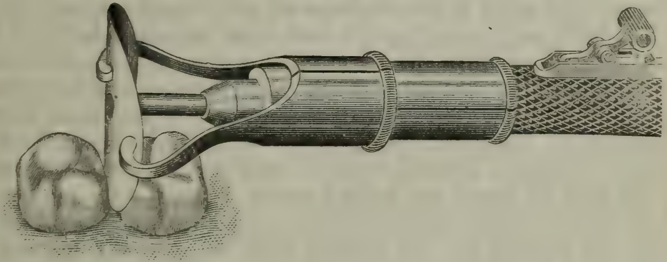
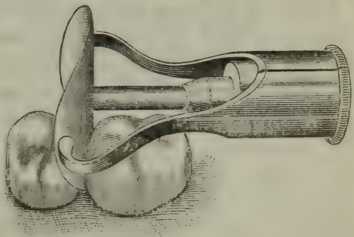


Fig. 4.

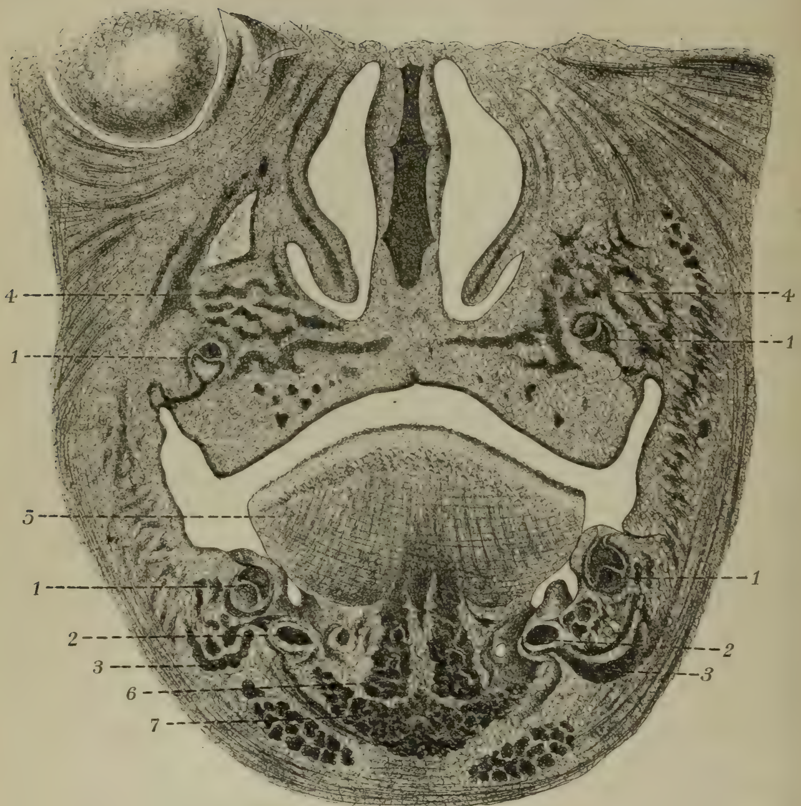


The instrument shown in Figs. 3 and 4 is intended to curve the disks from side to side; as shown in Fig. 3, to polish the distal surfaces, and as shown in Fig. 4, the mesial.

The instruments are of brass, except the arms, which should be of steel. They are simple and efficient.—William Herbert Rollins.

Salivary Incrustations on Dental Plates.—The methods usually resorted to in removing salivary deposits from dental plates are mechanical, viz., by scraping, consuming considerable time, and friction with a wheel brush. The method I have adopted is simple, and may be considered a chemical one. The saliva, having an alkaline reaction, its salts being principally sodium, calcium, and potassium phosphates, forms a deposit that may be removed by using a solution of carbolic acid from 3 to 5 per cent., the strength depending upon the thickness of the incrustation. The carbolic acid being anti-septic and non-corrosive in the strength mentioned, does not injure the plate, but keeps it sweet. Theoretically, the carbolic acid, combining with the alkaline bases, forms carbolates, thereby loosening the deposits. By immersing the plate on retiring at night, and allowing it to remain in the solution until the following morning, the incrustation is easily removed by a flow of water from the faucet and gentle friction with a toothbrush.—James Craig, M.D., *Jersey City*, *N. J.*

A Case of Epithelioma.—Patient a man about forty years of age,—a tobacco manufacturer,—of temperate and regular habits; had always enjoyed good health. In 1882 he had a partial upper plate placed in the mouth over several diseased roots. The dentist advised leaving the roots in position without having attempted to restore them to healthy condition. The plate was unsatisfactory, and in about three months the tongue was irritated by one of the teeth which had been broken. A sore spot developed opposite the left molar. For several weeks it gave but little trouble, and he neglected treatment until he suffered pain from eating hard or highly-seasoned food. He came under my care in February, 1883, at which time the left side of his tongue opposite the molars and bicuspids was about twice its normal thickness, and had a "lumpy" feeling when pressed between the thumb and finger. The left submaxillary gland was enlarged to about the size of a walnut. I extracted at several sittings five teeth and four roots. The gums healed kindly. By my advice he placed himself under the care of one of the leading surgeons of this city. Mouth-washes, tonics, and opiates constituted the treatment. The submaxillary gland continued to enlarge rapidly. It was lanced and discharged freely for a few days, and the patient was able to attend to business for some weeks. Then the other gland began to enlarge, and after being opened also discharged freely. The opening was nearly over the sterno-mastoid muscle. There was again a short respite, during which he was able to attend to business. There was a profuse flow of saliva, which had but little odor. After the 1st of August he was unable to articulate, and lost to a great extent the use of the tongue and lower jaw. The discharge from the submaxillary glands was now continuous and offensive. The dressings were of carbolized oakum, changed three times a day. For some time he lived entirely on liquids; latterly on very small quantities of milk and brandy. He died about October 1st from exhaustion. At the time of his death the tissues had sloughed from the left side of the neck, from the margin of the jaw nearly to the clavicle, exposing the muscles, which were in some parts separated as though done by the dissecting-knife. The external carotid artery could be raised on the finger, and each pulsation seen and felt. The sterno-mastoid muscle could also be raised on the finger. The salivary glands were destroyed, and the floor of the mouth had sloughed out. The pharynx and upper portion of the trachea were visible, and all the glands of the neck were much enlarged. All this seems to have resulted from improper dental treatment and the subsequent neglect of the patient.—M. G. Jenison, M.D., D.D.S., *Washington*, *D. C.*



Drawn by the Author, from specimen cut through the face of a three months human embryo. magnified twenty-five diameters.

1 Germs of upper and lower first temporary molars

2. Meckel's cartilage.

3. Commencing ossification of inferior maxilla.

4. Commencing ossification of superior maxilla.

5. Tongue.

6 & 7 Genio-glossal and genio-hyoid muscles, cut transversely

THE
DENTAL COSMOS.

VOL. XXVI. PHILADELPHIA, APRIL, 1884. No. 4.

ORIGINAL COMMUNICATIONS.

EMBRYOLOGY: WITH SPECIAL REFERENCE TO THE DEVELOPMENT OF THE TEETH AND CONTIGUOUS PARTS.

BY J. L. WILLIAMS, NEW HAVEN, CONN.

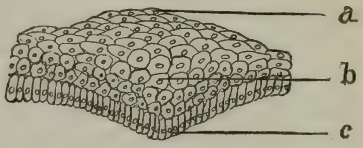
[Read before the New England Dental Society, at Providence, R. I., Oct. 4, 1883.]

(Continued from page 135.)

At the end of about the seventh week of intra-uterine existence the mouth of the embryo is quite well developed. Most of the standard works on dentistry begin the study of dentition by stating that about this time a groove, which has been called the primitive dental groove, may be observed at the borders of the jaws in which the future teeth are to be developed, the commencement of which is said to begin with the formation of fine papillæ in the bottom of this groove. Many of the first sections of fetal jaws which I prepared seemed to confirm this view, but the study of better and more carefully prepared specimens demonstrated it to be an error. The accompanying illustration (Fig. 12) will show how this error has arisen.

If an imaginary line be drawn through the cuboidal layer of epithelial cells, directly over the position which will be occupied by the future jaws of the embryo, it will represent the first observable indication of the development of the teeth. These cells, in obedience to the law of typal requirement, begin to increase rapidly in size. This growth forces the columnar layer of cells downwards and the flat layer upwards. This upward bulging of the flat layer forms a band, the *bourrelet* of Legros and Magitot, while the downward curving of the columnar layer gives, in transverse section, the V-shaped ap-

FIG. 12.

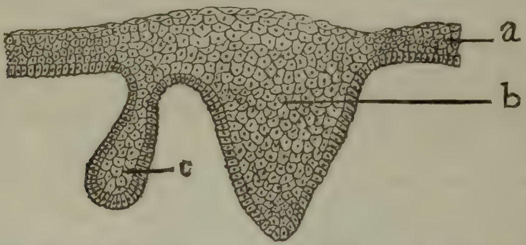


a, Flat layer of epithelial cells thrown upward into the "burrelet" of Legros and Magitot; *b*, enlargement and proliferation of cells in cuboidal layer, forcing flat layer upward and columnar layer downward; *c*, columnar layer of cells directly over position which will be occupied by future jaw.

pearance. The exposure of these exceedingly delicate tissues to the action of chemical reagents, according to the older methods of preparing specimens, almost always caused a separation of the epithelial layer from the underlying dermal tissues. You can readily see what the appearance would be after the removal of the epithelium. It leaves the "primitive dental groove" of the older writers. I have specimens which illustrate with almost diagramatic clearness the different stages in the development of the teeth as explained by Goodsir, but it is hardly necessary to remark that they are of no value except for the purpose of explaining this ancient error.

From the inside of that portion of the epithelial band which sinks into the tissues of the jaw there grows out a thin layer, which is a continuous process extending the entire length of the band (Fig. 13)

FIG. 13.



a, Flat layer of epithelium; *b*, proliferation of cuboidal layer, forcing columnar layer downward, producing V-shaped appearance. The removal of these upper layers leaves the "primitive dental groove"; *c*, lamina from which arise the epithelial cords of enamel organs.

This lamina is produced not by an inward growth of the prismatic cells at this point, as we should naturally suppose, but by a rapid proliferation and increase in size of the cubodial or polygonal cells within the band, in the same manner that the band itself is developed. Upon the free edge of this band, which is directed inward and downward, there appear budding processes which correspond to the temporary teeth, in the number and in the order and time of their appearance. As these budding processes develop they become cords, which are covered on their external surface by the prismatic epithelium, while the interior is filled with the polygonal cells. A longitudinal section through this cord presents the appearance shown in the accompanying illustration.* (Fig. 14.)

As the epithelial cord drops down into the dermal tissue its free extremity enlarges, and the edges fold over, forming a cap which is

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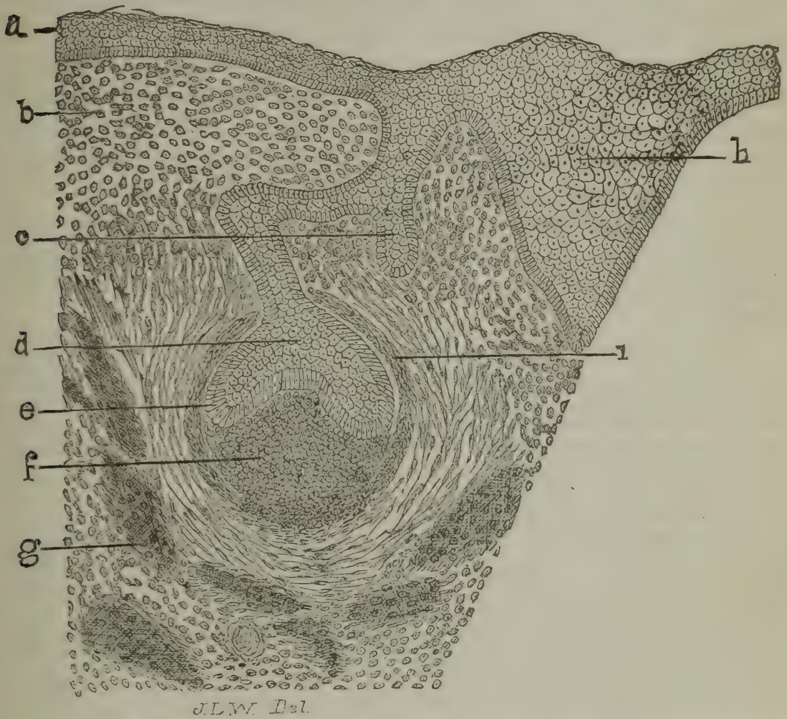
[*] Prof. Garretson speaks of the development of the teeth as a process which is *sui generis*. So far from this being true, the history of the early stages of the development of the teeth is almost identical with that of the development of the placoid scales of the elasmobranch.

the beginning of the enamel organ. Coincident with this stage of evolution, and immediately beneath the enamel organ, there appears an increased activity in the embryonal corpuscles of the dermal tissue, which results in the formation of minute papillæ. These papillæ constitute the first appearance of the dentinal germs. Their upper, rounded surface corresponds exactly to the cap-shaped concavity of the enamel organ. Although composed at this period of undifferentiated embryonal corpuscles, fusiform and stellate cells soon make their appearance, and a vascular loop is seen forming at the base of the bulb, which begins to assume the form of the future tooth, being cone-shaped for the incisors and cuspids, and for the molars covered with secondary protuberances equal in number to the cusps of the future crown.

FIG. 14.



a, Epithelial layers of mucous membrane lining mouth; *b*, embryonal corpuscles of dermal tissue of jaw; *c*, budding of cord of permanent tooth from cord of temporary tooth; *d*, enamel organ of temporary tooth; *e*, columnar or prismatic layer of cells from which ameloblasts or enamel cells are formed; *f*, dentine germ formed from embryonal corpuscles of dermal tissue; *g*, commencing ossification of inferior maxilla; *h*, V-shaped band, resulting from proliferation of cells of cuboidal layer; *i*, development of connective-tissue cells from embryonal corpuscles, forming sac which incloses tooth-germ.

I have now to speak of what I must regard as an error of the authors of the best work which has yet been written upon the development of the teeth. I refer to Dean's translation of Legros and Magitot's "Dental Follicle," from which I quote, page 100:

"There is, however, one peculiarity in the construction of the bulb which we ought particularly to notice here, and that is the nature of the external surface of this organ.

"If you examine the structure of a vertical section of the bulb, you will find that there exists at the periphery of this organ a thin, clear zone, which is easily distinguished from the subjacent tissue by its refraction. This zone, to which several anatomists have assigned important functions, is a thin stratum of amorphous material, which is wholly destitute of anatomical elements and of granulations.

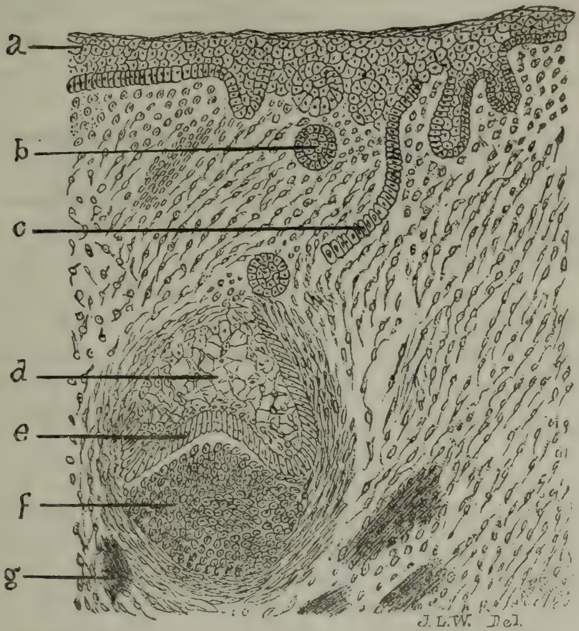
"This amorphous layer is not only more transparent, but somewhat denser, than the subjacent tissue of the bulb, so that sometimes it may be detached from the surface of the latter. This fact has led many anatomists to suppose that the bulb was invested with a distinct membrane (the *membrana præformativa* of Raschkow).

"We shall describe, in another work, the nature and functions of this structureless layer, but we will say this much in advance, that it is in this tissue that the ivory-cells (odontoblasts) make their first appearance."

I have examined many specimens mounted in dilute glycerin in which the elements of the enamel organ and those of the dentinal germ were in juxtaposition, but without discovering this structureless, transparent membrane. There is an appearance, however, of such a membrane in balsam-mounted specimens, which is occasioned by the shrinkage of the tissues incident to treatment with oil of cloves or other fluids for abstracting the water from the specimen. Now, while I am not prepared to deny *in toto* the existence of this wonderful *membrana præformativa*, I do most emphatically deny that it has any function or modifying influence in the process of the development of the teeth. I might safely base this statement on *a priori* reasoning, for function always implies an elementary structure. All physico-chemical changes occur in the cell or elementary unit form of the tissue or organ, and without the existence of these cells all such changes are impossible. Again, how is it possible that the odontoblasts, which are more than $\frac{1}{3000}$ of an inch in diameter, can be developed, as is claimed by the authors just quoted, in a membrane which Beale says is "certainly less than the $\frac{1}{20000}$ of an inch in thickness?" This error probably originated, as do most errors in scientific investigation, by presupposing a functional necessity for such a membrane and then trying to prove its existence. But, as we shall see further on, the function which has been attributed to this structureless layer is performed by another tissue and in a totally different manner.

While the changes to which we have referred are going on in the dentinal germ a wonderful transformation may be observed in the enamel organ. (Fig. 15.) The polygonal elements in the centre of the enamel organ are observed to be changing their form. I have not been able to determine whether, in accordance with Prof. Heitzmann's theory, there is a return of the polygonal cells to an embryonal condition preceding the development of the new structure; but there appear nucleated, stellate cells, the prolongations of which become joined to each other in a continuous structure, forming a curious and beautiful reticulum. (Fig. 16.)

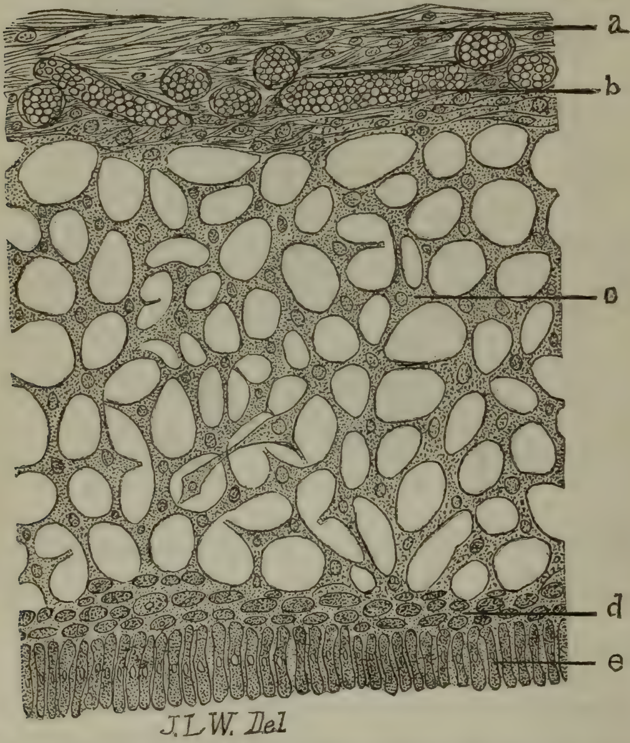
FIG. 15.



a, Epithelial layer of mucous membrane; *b*, *c*, breaking up of epithelial cord and formation of globular epithelial bodies, from which supernumerary teeth are said to sometimes develop; *d*, stellate cells of enamel organ; *e*, columnar cells from which enamel cells are developed; *f*, dentine germ; *g*, ossification of inferior maxilla.

My own observations lead me to believe that these stellate elements are the result of a direct modification of the primitive polygonal elements, and must therefore be regarded as strictly epithelial in their nature. The prismatic cells are, also, during this time undergoing important modifications. It has been supposed that the so-called ameloblasts, or enamel cells, are formed directly from the layer of columnar or prismatic epithelium which covers the face of the enamel organ. But, preceding the development of the ameloblasts, or enamel-formers, the original prismatic cells break up or divide into round, nucleated corpuscles, which change is denominated, by Prof. Heitzmann and Dr. Atkinson, a return to an embryonal condition. (Fig. 17.) From these embryonal corpuscles are developed the enamel-forming cells, and also an outer layer of smaller cells, from which is formed Nasmyth's membrane. The accompanying illustration (Fig. 18) is from a sketch drawn in Prof. Heitzmann's laboratory from a section cut from the jaw of a human embryo of about three and a half months. The sketch represents an amplification of about 1800 diameters. The formation of dentine, which begins shortly before that of enamel, is, according to Heitzmann, by a change of the odontoblasts, or medullary corpuscles, which everywhere cover the surface of the embryonal pulp, into

FIG. 16.



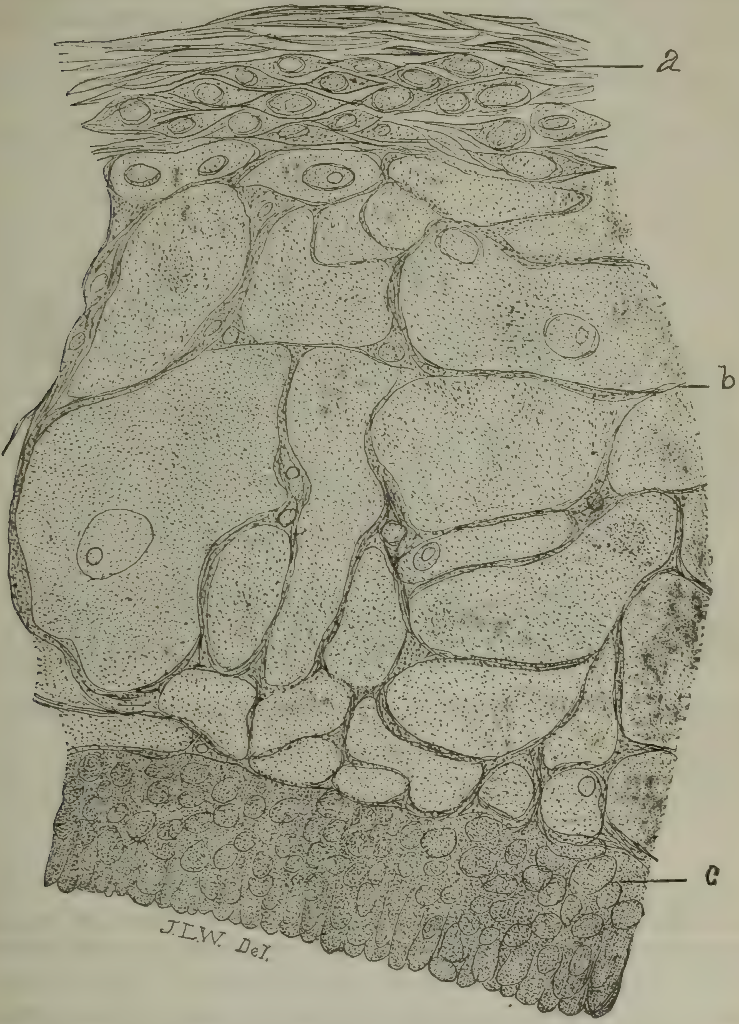
The specimen from which this drawing was made was placed under a one-tenth-inch immersion lens, magnifying about 800 diameters.

a, Connective tissue of tooth-sac; *b*, capillary vessels cut transversely and longitudinally, and filled with blood-corpuscles; *c*, reticulum of enamel organ; *d*, round and flat layer of cells, forming the so-called "Nasmyth's membrane"; *e*, ameloblasts, or enamel cells.

the glue-yielding basis-substance which becomes the seat of calcific infiltration.

The process of the ultimate formation of enamel is almost identical with that of dentine. The formation of these two tissues begins at the line of union of the dentine and enamel. The calcification

FIG. 17.



Drawn under same magnifying power as Fig. 16.

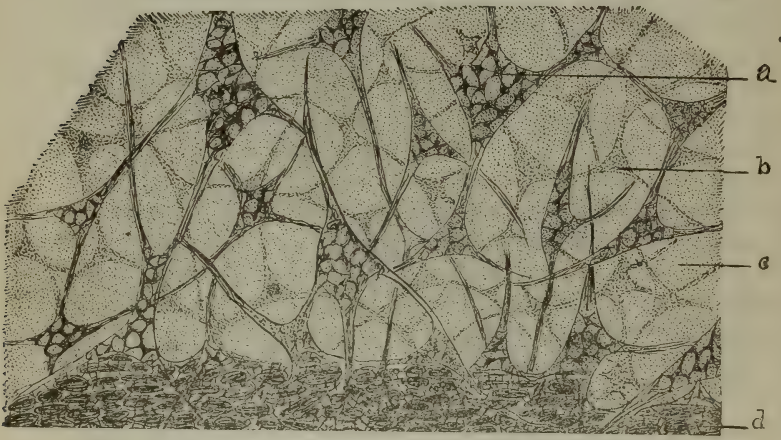
a, Connective-tissue cells of tooth-sac ; *b*, reticulum of enamel organ. In this drawing it is seen that the reticulum holds in its meshes very large, soft, granular corpuscles, heretofore known as the gelatinous fluid of the enamel organ. *c*, Breaking down of columnar layer of cells into embryonal corpuscles, from which ameloblasts are developed.

of the dentine proceeds from this line inward, while that of the enamel proceeds outward. This fact alone should be sufficient to prove that the material for the calcification of enamel does not come from the same immediate source as that from which dentine is built up, the change in quality being effected by its passage through the hypothetical membrana præformativa, as claimed by some eminent writers of the present day.

The material for the formation of the enamel comes through the enamel organ.

About a year ago I announced to Professor Heitzmann and a few friends in New York my belief that the enamel organ was a true secreting organ. Its epithelial origin and nature and its general appearance under high powers; the fact that it is surrounded by an intricate plexus of capillary blood-vessels; that the material for the formation of enamel has no other evident source, and that all epithelial in-growths from the skin layer are glandular in their nature, led me to this conclusion. I must regard the opinion as well founded until I see some evidence of its untenableness.

FIG. 18.



Enamel organ and "Nasmyth's layer" of cells, drawn under a magnifying power of 1800 diameters.

a, Portions of the reticulum which lie exactly in focus. The points of intersection are seen to be made up of a finer and more delicate reticulum. *b*, Parts which lie a little beyond focus; *c*, granular matter held in the meshes of the reticulum; *d*, "Nasmyth's membrane," or layer of flat cells just outside of enamel cells.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

Regular monthly meeting, January 15, 1884, at the house of Dr. C. E. Francis.

President Dr. Wm. Jarvie, Jr., in the chair.

Incidents of Office Practice.

Dr. C. D. Cook. This morning a lady, apparently about sixty years of age, came to my office, having a right superior temporary cuspid in her mouth. The left cuspid was a perfect and handsome permanent one, as were the incisors. This was the only temporary tooth remaining in her mouth. It had been filled on the distal surface, and the anterior surface was decayed. There was no possibility of mistaking it; it had the aged, yellow appearance of a worn-out tooth; it was very yellow, and on the labial face was abraded and worn, as we often find the teeth of persons in middle life, from brushing or other causes, and it was entirely different in shape from the other cuspid, which was white, clear, and brilliant. Some years ago I extracted a temporary superior left cuspid for a lady probably thirty-two or thirty-three years of age; the permanent cuspid was just erupting; but I think I never until to-day saw a milk tooth in the mouth of a person sixty years of age.

Dr. S. C. G. Watkins, of Mont Clair, N. J. I have here a lower molar which I extracted a few weeks ago, and which I believe has been split open from pressure of gas in the nerve canal. When I extracted it the mesial half of the mesial root was left remaining in the socket. I looked in the socket again, found it, and removed it very easily. The tooth was entirely embedded in pus, was quite loose, and I supposed it was split from the force of gas generated in the nerve canal.

Dr. Bödecker. Had the patient noticed any report?

Dr. Watkins. He had not.

Dr. C. E. Francis. I have heard in my lifetime of several cases similar to the one just reported, but have doubted if they could have been caused by explosion from an accumulation of gas. Some two years ago I received a call from a gentleman whose second inferior left molar was giving him trouble. I examined it carefully with instrument and mouth-glass, but assured him that it was perfectly sound. He insisted, however, that it was a painful tooth, saying also that if I pressed it with my finger it would hurt him. Again taking an instrument, I pressed laterally against the crown and discovered that it was split through the center, from one side to the other, and would open on being moved. The pulp was alive and apparently healthy. The patient could not possibly imagine how the tooth became fractured. As it was desirable to save the tooth, I decided to try to do so. I attempted to use a drill on the buccal surface, but found the dentine exceedingly sensitive. I then wound and firmly secured the parts with waxed floss-silk and ground away the cusps, after which I cut away a portion of each side with a thin disk. This done, a gold crown or shell was made to envelop the entire tooth, and fitted as accurately as possible. The gold crown was then lined with a paste of oxyphosphate of zinc and forced to its place. From that time to the present the tooth has not caused a moment's discomfort. In this case it is certain that the fracture was not caused by pressure of gas in the pulp-chamber, nor has the patient the slightest idea how the tooth became split.

President Jarvie. It may be an interesting question for discussion, whether a tooth ever is split from the action of gas generated by decomposing pulp-tissue.

Dr. C. F. W. Bödecker. I have seen, during the last two years, two such cases, both of them upper molars. In both instances the lingual root was split off from the lingual portion of the crown to the bifurcation of the three roots. In one instance the tooth contained a living pulp, and, strange to say, the person never knew when the tooth was split. In the other case, however, in which the pulp was dead, the patient had just bitten on a crust of bread, when, as he told me, the tooth was cracked, giving a loud report. The pulp-cavity had been previously filled. In the first instance I extracted the root and removed the pulp, which seemed to be the only thing that could be done, because pulpitis set in, and the irritation of the pulp towards the pericementum of the lingual root was so severe that the root had to be lost, although the molar is yet in the mouth, supported as it is by the two buccal roots only. In the case of the dead pulp I drilled through from the buccal towards the lingual portion of the tooth, and inserted from the lingual surface a gold wire with a rather broad head fitted upon it, on the other end of which I made a screw, countersinking the head in the buccal portion of the tooth,—which could be done safely, the tooth being dead and containing a large filling. I fastened the two parts of the tooth together with this screw, previously soaking the cavity with a solution of gutta-percha, and succeeded in making the tooth comfortable again. I saw it about nine or ten months ago, and it was then in perfect condition.

President Jarvie. Do these cases of fracture occur from the generation of gas in the pulp canal?

Dr. Bödecker. I do not know; I do not believe so in the case of the one which contained the living pulp, but the other one might have occurred from that cause.

Dr. Cook. I would like to ask Dr. Watkins if he is quite sure he did not fracture the tooth in extracting it. A very large portion of the enamel of the cervical wall is broken away, just as it might have been by the forceps when a tooth is dead.

Dr. Watkins. The gentleman told me that a piece of enamel broke off a very few days after the tooth had been filled, and I think he said it was filled about eight years ago; also that it had given him trouble nearly ever since. When he came to me the tooth was very loose—so much so that in extracting it I did not have to use any strength at all. When I extracted it I was surprised at the peculiar appearance of the root, and after washing and examining it I went back to the mouth to see what was there. I found the other part of the root very loose, not attached to the jaw at all, but imbedded in pus; so it could not have been fractured in the operation of extracting it.

Dr. Woodward. There is no doubt in my mind that a tooth can be split by the generation of gas in the pulp-chamber. I well remember that some years ago a patient came to my office to have a perfectly sound but dead lower molar extracted. She said that the day before, while sitting in her room sewing, there was a report in her mouth almost as loud as that of a pistol, or loud enough for her sister to hear, who was in an adjoining room, and who exclaimed, "What is that?" Upon closing her teeth she "found that a molar had been sprung from its socket."

When I came to extract it I found it so loose that I took it out with great ease, although the processes around the roots were intact and the gums appeared healthy. The split was directly through the bifurcation of the two roots.

Dr. Bödecker. I believe that if the tooth had been split in the mouth only a few days there would be or ought to be evidence to that effect which, under a microscope, could be discovered; because, if a tooth or a bone is surrounded by an inflammatory reaction for any length of time, it will show a melting out of the lime-salts in one or more places.

Dr. S. G. Perry. Some little time ago a member of the executive committee whom we all love very much asked me if I would make a few remarks at this meeting, and I answered that perhaps I might say a few words upon a subject I was interested in. Subsequently I reconsidered the question, and came to the conclusion that I would not, and told him so; but it seems that the notices for the meeting were out, and I now find myself announced to make some remarks when I have nothing to say. However, I will try to tell you a little something about instruments, although there is not much to be said that is new; there cannot be much said that is new at this late day; we can only reproduce, with slight variations and refinements, the old well worn forms, modifying them to suit our particular modes of operating, and mounting them in accordance with our own ideas of beauty of proportion and of size.

Last season, while in the mountains spending the summer vacation with Dr. Darby, who had taken along three or four files and some brass wire, we occupied an hour or two each morning in designing and making instrument patterns. When we returned they were given to an instrument maker, who reproduced them in steel as you see here. Part of the designs were Dr. Darby's and part were mine, but it would be difficult to say which were distinctly his and which were distinctly mine. When two persons are working at the same bench, on the same mornings, making pretty much the same instruments, and often making suggestions to each other, you can see that it would be difficult to say which were mine and which were his, as they were finally worked out.

First, in reference to handles. I have been for a long time strongly in favor of socket handles. The more I know about them the more I favor them. I was greatly pleased to see the socket-handle instruments that were brought out by Johnston Bros. some years ago, and which are now made by The S. S. White Dental Manufacturing Co. It seems a real advance when socket-handle instruments can be made so nicely and so finely finished as they are now produced. Besides the better form and finish of the socket handles, I think you can procure points of a better quality of steel than would be the case if the points and handles were of one piece, as wire drawn to small sizes is uniformly condensed by the draw-plate and not in danger of overheating as in forging. I have been very much in love with wood handles, made a little larger than the steel handles can be made, because of their comfortable feeling in the hand. I cannot tell you just why, but great satisfaction comes from the feeling or touch of these wood-handled instruments. It is something like the feeling the sculptor must have when he cuts the marble with a favorite fine-cutting chisel, or the painter when he paints with an extra fine brush. Our friend, Dr. Kingsley, whose artistic tendencies we all know, will confirm me in this, I am sure.

I can assure you, gentleman, that with instruments perfectly adapted to the work and as well made as you see these are, it is not labor any more to fill teeth,—it is a pleasure, a real satisfaction. In this bundle is a set which I designed, with some help from Dr. Darby, for scaling teeth and trimming gold fillings; they are really a set of scalers and trimmers combined. The points are delicate, and the angles are so arranged that they will reach every surface of every tooth, and they will also reach the cervical walls of every gold filling. They are so delicate that they can be carried near to the ends of the roots of the teeth without much disturbance of the gum. They do not differ, perhaps, in their general shape, from those heretofore made, although I do not know that you will find any in the market just like them. I have here a little scaler that is modeled very much like Dr. Lord's, except that it is a shade thicker, but not nearly so wide,—the object being to so shape it that it will pass in between the necks of the teeth without disturbing the gum as much as a wider-bladed instrument would be likely to do. Here is a very delicate pair of scalers for the anterior and posterior sides of the upper and lower front teeth. There is also a little straight scaler, as delicate and thin and fine as anything can be made and still have sufficient strength. I have used it for many years, and for working between the lower front teeth, or any of the teeth where you do not want to disturb the gum, it is just as nice an instrument as can be devised, it seems to me. I have found that these instruments are quite as serviceable for trimming the margins of fillings as they are for scaling the teeth.

Dr. Benjamin Lord. Will Dr. Perry tell us why he can have better steel for the small socket points than where the points and handles are united?

Dr. Perry. Because I should think an instrument maker would work the rod into these delicate points with less danger of injuring the steel than if they were worked down from a bar as large as is usual in these socket handles.

Dr. Lord. I think the steel that comes in bars of the size of the handles of the instruments is of the same quality as the smaller bars.

Dr. Perry. Perhaps you are right, but I had supposed that steel was improved in texture by being drawn down into rods like piano-wire. In this bundle is a set of delicate excavators, rather smaller than those that are generally used, and so shaped as to reach all sides of most small cavities. They are so well tempered that all those having a spoon-shape have been used without sharpening nearly every hour of every day for almost a month; and yet, if you will look at them with a magnifying glass, you will see that every one of them has still a very fair edge. Here is a lot of old-fashioned ivory-handled instruments which I have had turned down into convenient shape and changed into sockets. Many of such old-fashioned instruments, which some dentists throw aside as useless, could be easily converted into useful socket handles. These which I have had changed are used mostly for hand-pressure pluggers. I have settled down upon two uniform sizes of sockets for all my instruments. I do not regard with favor the method of fastening the instruments into the sockets with the screw as in the Snow & Lewis automatic plugger, because a great deal of time is required to change them, and I do not find that they are more firmly fixed than those that go in with a gradual taper. With grooved pliers these tapered instruments can be changed in a moment. Perhaps you will infer, because you see so many hand instruments here, that I do most of my work by hand-pressure. I try to be as ready with one method as the other, using mallet force of one kind or another for all large operations, but generally employing hand-pressure wherever I want to use soft gold.

Dr. Benjamin Lord. May I ask Dr. Perry if he uses the mallet as much as or more than he did five or ten years ago?

Dr. Perry. I do not use it quite as much. This is true in filling the front teeth, which I do to a great extent by standing upright and filling from the under side by the aid of the hand-mirror. In this way I consider that I can do better work and do it more easily for myself and more agreeably to my patient. Formerly I used the mallet for such operations.

Here are some plugger-points that are very delicate in the shank, but that swell out at the point. After becoming accustomed to them, I think it will be impossible for one to go back to the use of the ordinary instruments which are so clumsy in the shank. You will see that these are so designed that there is no surplus material. Several are somewhat like some of the Chappell pluggers, yet if you will examine carefully you will see that they are not by any means the same. Here is one which for the electric or the Bonwill mallet is more nearly a universal instrument than any I have ever seen. It is a sort of double foot-shaped instrument, with the face inclined at such an angle and with the corners so rounded off that it seems to reach almost any part of any cavity. I have never used a single instrument that has given me so much satisfaction.

These are some instruments made by Dr. Darby, which I slipped into my pocket in order to show them at this meeting. They are larger than mine, and are strong and firm, and there are many shapes that are decidedly taking, and that are capable of reaching places in the teeth that are not reached by the ordinary instruments.

I have always used the automatic mallet more or less, and always expect to use it, because with it I can pack soft gold with a good, penetrating, reaching blow. Having four or five such mallets at hand, I waste no time in changing points. I have here some long points, which I use with the automatic mallet; they are made long enough to avoid the rubbing of the mallet tube against the face or lips. It is a pleasure to work with them.

I wish also to exhibit here one of a set of mallet pluggers which

I have designed for all cavities in the back teeth which cannot be reached by the instruments now employed. They can be used with the automatic, the electric, the mechanical, or the hand mallet. They are made with a long curve, which is so shaped that the point of the instrument can be carried back even to the posterior surfaces of the wisdom tooth, and yet when the blow is given it can be directed forward sufficiently to make it a very serviceable instrument for these surfaces. It is also of the greatest value in reaching the grinding surface fissures of the lower molars, which so often incline inward in such a way that no direct blow can be given by any of the ordinary instruments now in use. It is of the greatest value, also, when used on the buccal surfaces of the lower second molar and wisdom teeth. The curve is such that a forward blow can be given with the greatest ease. It is also of considerable service in the fissures and posterior surfaces of the upper molars. It is so shaped that the point is nearly on a line with the axis of the body of the plugger, so that there is no loss of power or unsteadiness of motion. The instrument is so heavy that there is considerable inertia to overcome, and with so large a bow there must be some spring when the blow is delivered, but it is not enough to be particularly noticeable or to prevent the efficient working of the instrument. I have used these instruments for a considerable time, and I consider them invaluable. By their use it is possible to apply direct mallet-force against the walls of many cavities that have not, except by hand-pressure, been so accurately reached heretofore.

If you have nice instruments and try to do nice work, you ought also to keep a nice record of it. Four or five years ago, not being satisfied with the charts in use, I made a drawing with some little care, which The S. S. White Dental Manufacturing Company had engraved, and then printed from the plate enough for a few bound copies. On this chart it is possible to make a perfectly accurate record of any filling on any side of any tooth; and it is so arranged that you can make a pencil drawing of the roots, and so show every operation that can be performed upon the teeth. I do not keep an account of prices in this book. I used to do so, but have recently settled down to the plan of keeping this as a chart-book only. This is the plan which has been followed by Dr. Rich for a great many years, he having been one of the first to use a chart-book.

Dr. J. B. Rich. I have had great pleasure in examining the instruments designed by Drs. Darby and Perry, and exhibited by Dr. Perry this evening. Their forms are admirable, and in this particular they are certainly better adapted to the skillful performance of the operations for which they are intended than any others that I have heretofore seen. Their size is a particularly good feature, and these gentlemen have shown great skill in their construction, by so arranging the proportions of the different parts that the proper amount of material to insure strength and stiffness is placed at the points where those qualities are needed; and they have done this without sacrificing the beauty and symmetry of the general form; for they are delicate and graceful in appearance without being weak, and combine all the valuable qualities needed in such instruments. Dr. Perry stated that he liked wooden handles better than any others that he used, and yet he could not tell why. The reason is that wood, not being a good conductor of caloric, does not transmit it readily, and therefore in handling it there are no sudden changes of temperature experienced; the fingers do not lose their sensibility when they grasp it. Handles covered with leather are still better than wood, for the same reason. Many years ago I invented a method of covering the handles of dental instruments with leather; by which several desirable qualities were gained, one of which was that just mentioned. Dr. Perry, in the course of his remarks, also stated that he did not like the screw socket. If the instruments are made to fit accurately into a taper socket, the screw at the end is unnecessary; instruments so constructed are readily made firm by pressing them into the socket with force, and when close contact is made rotating the instrument half a turn; if the fit is accurate it will require considerable force, applied in the same way, to dislodge them. This is the method used to attach centers, chucks, and other tools to the mandrels of fine lathes. An additional security against instruments falling out of their sockets can be had by employing a method I originated many years ago, and which I have always practiced with great satisfaction wherever an instrument or tool is inserted in a socket,—that is, to line the inside of the socket with a thin film of pure beeswax, which can best be done by placing a small piece of the wax in the socket, and inserting a piece of metal that fits it and has been made hot enough to melt the wax. When the hot instrument has been withdrawn the inside of the socket will have retained enough of the wax to firmly hold any tool that fits it closely, and it is scarcely ever necessary to renew it. There have been several forms of pliers made to hold instruments when they are being forced or screwed into their sockets. I like a device of my own better than any other that I have seen for that purpose, and that is to line the flat inside surface of the jaws of the pliers with rawhide or heavy catgut violin strings. This substance can be either cemented to the jaws of the pliers, or soaked in water and then wound around them. The most highly polished or nickel-plated metal can be firmly grasped by pliers so covered without defacing or scratching its surface, and the rawhide need not be formed to fit the shape of the instrument. Rawhide is also a good substance to line the jaws of a vise when used for holding polished articles.

Dr. Benjamin Lord. I shall say a few words in relation to a new form of gold, recently brought out.

There has always been very great interest felt on the part of most dentists in the form in which they use gold,—some preferring pellets, some cylinders, some blocks, some rolls or ropes, and others strips; very likely other forms than these named are also used by some. Then there is the great question of cohesive or non-cohesive, which has provoked so much discussion, and which is still unsettled.

We have recently had brought out, by Mr. R. S. Williams, a new form of gold which he calls "electric gold," and from the manner in which it is prepared, or the way it is put up for use, it is rendered much more cohesive than any gold I have ever used; and in addition to its extra-cohesive qualities, it works softer, is more pliable, or less stiff and harsh, than other forms of cohesive gold.

I have felt and believed that the best form in which to use gold was in ropes or rolls, slightly flattened by pressure, and in strips of suitable width for the given cavity,—using both forms, more or less, in the same cavity.

This new form of gold is put up for use in folds, made up loosely of a given number of sheets, so as to be equal to the high numbers of 30, 40, 60, and higher if required. This fold is to be cut into strips of the desired width for use.

I have used cohesive gold in the form of strips,—that being the best form for me to use it in,—so that I have found this new arrangement for putting up gold particularly desirable, as it obviates the necessity for folding and handling, thereby saving much time and preventing the injury that often comes from handling the sheets. As with the usual forms of cohesive gold, I use this only for surfaces and for contour operations. Then it is particularly adapted to extending the filling over the thin edge of very frail walls, to give support and protection to them. Unless I am greatly mistaken, it will be found that this preparation of gold, for all purposes for which cohesive gold is used, is a very great gain over the usual forms and qualities of the cohesive preparations.

In all cases this electric gold must be annealed before it is used. This I find is best done by passing the strips into and through an alcohol flame until made quite red with the heat, holding it with pliers having very fine points. It will be found that much care will be required in annealing the No. 30, and even the No. 40, in order to prevent melting. I have found Nos. 40 and 60 preferable to No. 30, that being too thin except perhaps for very thin edges.

The form is adapted to non-cohesive as well as cohesive. This form of preparing gold for our use is a great advantage over the sheets in books, as after a book is opened the gold is much more exposed to the atmosphere than it will be in the boxes. Then, as I said, all handling is avoided. It is well known that dental gold possesses qualities which are readily impaired by handling and exposure, and that it never works so well after it is left exposed for even a day.

Dr. Woodward. I would ask Dr. Lord if he commences the cavity with this form of gold, or uses it for finishing only.

Dr. Lord. I would use this as I always use cohesive gold, for extending the filling beyond the margins of the cavity. I use soft or non-cohesive for the cavity proper—for lining the walls and filling up to the margins; then force the cohesive into the soft, securing it mechanically as well as otherwise, which further condenses the soft and at once gives a cohesive to build upon.

Dr. C. F. W. Bödecker. I have used some of this gold, and have found it to be one of the most excellent preparations that I have ever seen. Probably it originated in Germany three or four years since. About that time a dentist by the name of Herbst, of Bremen, experimented with a new method of introducing gold foil into teeth, and at the present time in Germany this method is attracting a great deal of attention. By this method the gold is introduced by neither hand-pressure nor the mallet, but by placing in a dental engine an instrument very much like a burnisher, which burnishes the gold against the walls of the cavity. I believe it manipulates very much like the German preparation. I have seen some rather large contour fillings, in upper bicuspids, made by Dr. Herbst, by the method before alluded to, which were beautifully done, and the patient as well as the operator informed me that each one of those large fillings was made in thirty-five minutes. During the last two years the German dental journals have frequently mentioned this method of filling, and I believe there is a future for it. When I go to Europe next summer I shall certainly make more detailed inquiries in regard to it. I want to say that the manufacturer in Germany does not claim that this gold is a new compound, or that the gold so prepared has any new properties, but that it is merely a new method of manufacturing absolutely pure gold. So far as the introduction of the gold into the cavity is concerned, I know that Dr. Shumway has introduced it by burnishing with an ivory point and hand-pressure. But the main new feature of this operation is the rapid rotary motion of the burnisher. In one of the journals it is stated that German dentists have tried other forms of gold and tin in the same way, and have found that by the rapid rotation of the burnisher they get the same effect.

Dr. Lord. I may say that Mr. Williams tells me that the peculiarly cohesive and soft working qualities of the electric gold is mainly due to the extreme care in refining and the cleanliness of the way in which it is made, together with the form in which it is put up.

Dr. J. B. Rich. There is one peculiarity about this electric gold that I like, and that is the mode of preparing it for use by piling in the most accurate manner a number of the sheets together, so that the dentist can procure it with the number of thicknesses he may wish to use without the trouble of folding, and so that when he wishes to prepare it for the cavity he has only to cut it of the width he desires to use. The peculiar package in which it is sold is certainly an advance on the mode of putting up the gold, after it is made so that it can be handled and prepared for use without touching it with the fingers. It is the best method that I have seen employed for that purpose, and deserves commendation.

The very adhesive quality which this gold possesses is not a new feature. Gold that is made as near pure as possible can always be made as adhesive as this is by proper annealing.

There has been considerable written and said recently about a method of constructing fillings by burnishing the layers of gold together, and this mode of applying pressure is claimed to be new and as having been recently originated in Germany. It is quite probable that this is a new method to the dentists of Germany, but it is not new here. That mode of applying pressure to make gold adhere has been known and practiced in this country ever since adhesive gold has been used for filling teeth. I have for many years constructed fillings of a certain class (those with very delicate and attenuated margins) with burnishers. Those who have not used pressure in this way, if they will try it, will be agreeably surprised to find how perfectly ribbons of adhesive gold may be welded together by means of a burnisher, and with very slight pressure. The use of burnishers in a dental engine is not a new feature, and the mere substituting the burnisher used in the engine for the burnisher used in the hand is not presenting a new principle. The members of this society will no doubt remember that a long time ago Dr. Shumway, of Plymouth, Mass., gave an illustration at one of its meetings of a mode of constructing fillings that he had followed exclusively for a number of years. His method was to burnish the layers of adhesive foil together, with a moderate amount of pressure, with burnishers made of ivory. It is also claimed, by those who present us with this valuable information from Germany, that another important discovery has been made there in the manner of preparing gold for the use of the dentist, and it is claimed that it is by the use of this gold so prepared that the wonderful feat of burnishing the separate layers into a solid mass is made possible. Good for Germany! The world moves.

Dr. E. T. Payne then read the following paper on "Gutta-percha":

Gutta-percha is an article of so much importance in the professional and commercial world, that it has seemed to me profitable to study its introduction into Europe and America, and to consider some of its characteristics as an article of utility in and out of professional circles. I am led to this in part because I have reason to believe that its history is not thoroughly known even to many members of our profession. Probably this is so because gutta-percha stopping came to the hands of those who began the practice of dentistry less than thirty years ago much as the common blessings of life come to us, and like those blessings it was appropriated without much thought as to whence it came.

It may be well to say right here that the proper pronunciation of the word is *percha*, and not *perka*, as it is sometimes incorrectly called.

Gutta-percha is the inspissated juice of a tree which belongs to the natural order Sapotaceæ. It abounds in the forests of the Malayan peninsula, and forms the principal portion of the jungle in the bottoms. It is also found in Borneo and other islands of the Indian Archipelago.

The greatly increasing demand for the material has led to searches for the tree in other parts of the world, and within the last year specimens of the gum have been received in New York from Dutch Guiana, Mexico, and the interior of Africa; but the specimens presented have more or less of the nature of rubber, and are consequently not valuable for purposes for which pure gutta-percha is used. The present supply is derived from the Dutch possessions in the Indian Archipelago. The tree grows to a large size, commonly from three to four feet, sometimes six feet, in diameter; from sixty to seventy feet high, with numerous branches; its leaves are from four to five inches long and two inches wide, and are bright green above and brownish beneath. The flowers are small and white. The wood is peculiarly soft and spongy, pale colored, and traversed by longitudinal receptacles filled with the gum, forming ebony-black lines. The Malayans recognized the value of the juice of this tree long before Europeans became acquainted with the article. They found that the gum would become plastic in hot water, and, when molded into any form, would retain this when cold. They made it into basins, vases, shoes, whips, etc. Dr. Montgomerie, a surgeon in the British service, recognized the usefulness of the article when stationed at Singapore in 1822; but he did not give the matter particular attention until again stationed at the same place in 1842. In

1843 Dr. D'Almeida, of Singapore, brought specimens of the gum to England and laid them before the Royal Asiatic Society. They attracted little attention until further communications from Dr. Montgomerie established the importance of the article. In 1844 a shipment of 200 pounds was made from Singapore as an experiment, and soon after the product became a commercial article of importance. The large trees which were formerly abundant on the island of Singapore were cut down by the natives to the number of 70,000, in order to supply the demand for the first four years. The government soon found that the supply would be entirely cut off if measures were not taken to protect the trees; and a system of tapping, similar to the New England custom with maple trees, was adopted and rigidly adhered to.

Although the necessary system of tapping continues to supply the great demand, the article thus obtained is decidedly inferior to that secured by cutting the tree and stripping the bark from the trunk, as the portion obtained by scraping the inside of the bark and the outside of the exposed trunk is said by experienced workers in gutta-percha to possess at least double the quality of firmness and toughness.

The material found its way to America early in this century as an article of curiosity, brought by captains of vessels engaged in the East India trade, but was not considered of value, except as such, until about 1844, at which time it had attracted attention in England, and small quantities found their way to New York.

The first importation of importance was made by Mr. Samuel T. Armstrong, of Brooklyn, N. Y., in the latter part of 1846. Mr. Armstrong went to England in 1846 and bought patent-rights to manufacture the article in the United States; and in 1847 he commenced its manufacture in Brooklyn.

During the years 1843 to 1847 Morse was perfecting his telegraph wires, and they were beginning to be in general use on land. How to cross rivers and other bodies of water was a problem which was solved by Mr. Armstrong, who devised and modified machinery for making gutta-percha tubing for the purpose of coating telegraph wires, and during the year 1848 cables were laid in the Passaic and Hudson rivers, on the line from Philadelphia to New York.

It is not my purpose to enlarge upon the importance of the uses of this material in connection with the rapidly growing electrical system; but too much importance can hardly be attached to it, as it is so intimately connected with the use of electricity.

Think of the absence of the submarine system of telegraphy! Perhaps some substance could be found which combines elasticity, great strength, and which is a non-conductor of electricity, but none has been, and there has been a keen incentive to do so. Rubber has been a little used as a coating for cables, but it is very difficult to work it in its pure condition, and experience proves that rubber decays just in proportion as its atoms are separated by a foreign substance.

Gutta-percha plays an important part in surgery as well as the general practice of medicine. It is much used for splints, catheters, stethoscopes, and a variety of other useful articles. A saturated solution in chloroform is much used, as like collodion its solution makes a close adhesive film by the evaporation of the solvent, binding together parts separated by incisions, and forming an artificial cuticle when this is removed by cutaneous disease or from other cause.

A word in regard to the quality of the present importations, and a few remarks on its characteristics, and I will confine myself to its application to dentistry. As before mentioned, the first importations were obtained by destroying the trees and obtaining a small quantity of material of the best quality. The system of tapping resulted in an article less valuable, but it was superior to the best importation of to-day, for the reason that the juice was collected and kept clean, while at present the specks of dirt and bark are put in to make weight, and in many instances earthy matter is incorporated in the crude material before it leaves the island. One reason why the various brands of gutta-percha filling vary in quality from time to time is because different lots of the gum differ in quality. Great care is necessary in purifying the gums before adding the powders, as the commercial article cannot be depended upon. The familiar article in drug-stores, which is so smooth and attractive to the eye, is useful in surgery and medicine, but it is worthless as a base for tooth-filling. It is known as oxidized gutta-percha.

Every year brings a new brand for trial, so great is the demand for mechanical purposes. A preparation of stopping known as Bevins's was at one time a very superior article, and it is often remarked that the secret of preparing it died with him. I am told by good authority that the material used by him was a chance lot of the finest quality of gum, and that he had no secrets beyond other painstaking manufacturers. It is well known that the brand was nearly worthless in a few years, and is now practically out of the market.

At a temperature of from 32° to 70° gutta-percha has, when purified, the tenacity of leather; though inelastic it is less flexible. It can be rolled and molded at from 145° to 155°, and in this condition it has the elasticity of caoutchouc, but loses it when it cools, and retains any shape given it when warm. It is capable of alternate hardening and softening any number of times without changes of property. It has a little less density then water, the commercial article having a specific gravity of .98.

Various chemical reagents, as alcohol, hydrochloric acid, alkaline solutions, the fatty oils, fermented liquors, etc., have no effect upon it. It dissolves in oil of turpentine, bisulphide of carbon, coal tar, oil, and chloroform. In water it is insoluble at all temperatures. It consists of carbon 86.36, hydrogen 12.15, and oxygen 1.49 per cent.—a composition identical with that of caoutchouc, except in the presence of oxygen, which is wanting in the latter. It is affected by vulcanizing the same as rubber, when sulphur or some of its compounds are used and subjected to a steam heat.

Its application and use in our profession was an event of great importance. It has been in constant employment as a material for filling teeth for thirty-five years, and it is safe to say that it has steadily grown in favor with all classes of dentists. Several dentists used the material for impression cups, and experiments were made with it as a base for artificial dentures before it was used as a filling for decayed teeth.

Whether the late Dr. Asa Hill, of Norwalk, Conn., whose instructions I had the privilege of enjoying for a number of years, was the first to use gutta-percha as a filling material is not known to me; but certainly to him is due the credit of introducing it to the profession. He gave the compound the name of "Hill's Stopping," and introduced it in the early part of 1848. In a communication to the *Dental News Letter*, dated September 26, 1848, Dr. Hill defended his circular, put forth some time before, and said the conviction was forced upon his mind that, "for *convenience*, *utility*, and *harmlessness* withal, it is invaluable." In this letter he said it was used and recommended by some of the ablest and most reputable dental practitioners in the world.

Although Dr. Hill defended and profited by his patent, it excited no little controversy among dentists. At a meeting of the American Society of Dental Surgeons in New York, in 1851, Dr. Hill was not received with favor and was not allowed to explain the benefits derived from the use of his new compound, because he would not make known the materials employed and his method of using them. Drs. W. H. Dwinelle and John B. Rich were present, but, while the record is silent, they were undoubtedly then as now in search of light regardless of patent-rights, and were anxious to hear what the doctor had to say. Dr. Rich was evidently favorably impressed, for that same year he is on record as recommending the filling as a non-conducting lining in the cavities of sensitive teeth. It is not my purpose to recommend any preparation or to express an opinion in regard to the relative value of the various brands now so abundantly offered for sale. It ought not to be considered a permanent filling; yet in secluded places on the necks of teeth it frequently does better service, as we all know, than so-called permanent filling material.

It is eminently a safe filling, rarely disappointing a man who uses it properly. One incident will suffice to explain this point. Not long ago a lady called to get relief from pain in a lower tooth. I began to examine some oxyphosphate filling between two molars. She told me the trouble could not be there, as I could see the beautiful white fillings Dr. —— put in her teeth nearly two years ago. I found cavities near the gum, and upon removing the filling I found one pulp dead and the other inflamed.

What would have been the result if the dentist had filled these same teeth with gutta-percha stopping? It is altogether likely that the patient would have gone back in less than a year and told the dentist that the fillings were out of her teeth, although they had not ached. He would have found, what we all find nearly every day, that the filling had worn down, indeed, but that the inner portion, and especially the tender portion over the pulp, was still well protected. The records of nearly every meeting of dentists since 1850 bear testimony to its usefulness, and the journals of to-day so often refer to this excellent material and its advantages that I have not thought it necessary to refer at length to my method of using it, or my views as to when it ought or ought not to be used. In my practice I rely upon it for saving the teeth of patients over sixty years of age, when teeth begin to fail on approximal surfaces. The peculiar softening of the teeth of many people at about this time of life renders the edges of cavities so brittle that a gold and frequently an amalgam filling fails, when gutta-percha will seem to clothe the exposed bone perfectly. In young teeth, also, it is invaluable, in that the bone becomes hardened under it, and it is so readily placed in the cavity.

For temporary fillings, when want of time prevents the use of gold, it is safer than other temporary fillings, as it appears to have failed and warns the patient, whereas the oxyphosphate filling often lulls the patient into a false security. I ought to emphasize one point regarding its use. I refer to the amount of heat that it is safe to employ in preparing it for the cavity. Gutta-percha will stand, without deterioration, almost any amount of steam heat; but more than 160° of dry heat is dangerous and often destructive.

The material seems to cook. When a given quantity has been overheated, and what I please to call cooked, it does not when cold differ very much in appearance or in its working qualities; but in three or four months it will be found worthless. This is a vital point, and one that is not as well understood by the profession as is generally supposed.

More care ought to be taken in heating the very small pieces, especially as it is the very general custom to heat the filling in or over the flame of a spirit lamp. The best lamp I have seen for preparing the gutta-percha filling for the cavity is the one known as Oliver's. Whatever means are taken to warm the filling, great care is necessary. Perhaps this point will weigh with some if I mention the fact that mechanics have had bitter and expensive experience as a result of overheating the covering of gutta-percha, when soldering the joint after splicing a cable. The gutta-percha has been found defective in consequence of being overheated, and now a low-melting solder is used, with a copper soldering tool, moderately heated. A lamp which combines simplicity with a steam heat is needed and ought to meet a ready sale.

I have not enlarged upon the use of this material, for reasons above given; and I have not made comparisons to any extent. This much I have pleasure in saying, that gutta-percha filling has a clean reputation after thirty-five years of trial, and has proved what Dr. Hill hoped for it in his letter written in 1848, viz., that, "for *convenience*, *utility*, and *harmlessness* withal, it is *invaluable*."

Dr. Perry. Dr. Payne is very modest. He did not say that he had himself made a preparation of gutta-percha. He sent me a sample of it some time ago, which I have used, and found to be as good as if not even a shade better than any other preparation of gutta-percha that I have ever used. Why does he not say something about it?

Dr. Payne. I had not intended to refer to my preparation of gutta-percha stopping; but, since Dr. Perry has made the inquiry, I will state that I have had a large experience in working the material, and have prepared an article which I think superior to anything of the kind in the market. In a short time I propose to introduce it to the profession through the usual channels. I have already, in a quiet way, placed it in the hands of a number of leading operators, and have received many favorable testimonials regarding it.

I wish to emphasize an important point in the paper with respect to heating gutta-percha when preparing it for the cavity. The maximum heat to which a gutta-percha filling should be subjected is 160 degrees, and any higher temperature will certainly be injurious, no matter whose preparation it may be.

Dr. Francis. Here is a little apparatus for heating gutta-percha, which Dr. Oliver gave me; it is a very nice article for that purpose. Is this the heater that Dr. Payne refers to?

Dr. Payne. It is practically the same, my apparatus differing only in having a glass top.

Dr. C. S. Stockton. It is quite marvellous how these materials will sometimes preserve teeth. I do think gutta-percha is one of the very best materials to preserve teeth that dentists use. In relation to the subject of instruments, when I was in Chicago Dr. Cushing presented me with a set of scalers that I have been very much pleased with, and when you see them in White's dental depot I think you will be also. They are very pleasant instruments in the hand, and very efficient for the purpose designed. He also showed me an instrument such as we have used as a saw, only this was a file, and reversible, and can be used for either side. You can trim the surfaces of approximal fillings in molars and bicuspids very nicely with it. I think it is in the hands of Mr. Williams for manufacturing.

Adjourned.

ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

The regular meeting of the Odontological Society of Pennsylvania was held January 5, 1884, at the residence of Dr. Daniel Neall, No. 1627 Summer Street, Philadelphia.

The following paper, on "The Etiology of Caries at the Gum-margins and the Labial and Buccal Surfaces of the Teeth," was read by E. T. Darby, M.D., D.D.S.:

The subject selected for me by the chairman of the executive committee is a good one, and has the advantage of not having been frequently discussed in this society; but in order to treat it intelligently it demands a threefold division, for there are certain conditions existing in labial and buccal caries which are not present in the earlier stages of the disease known as erosion. There are also two unlike conditions existing in labial and buccal decay. In one the disease begins in the enamel, and after its substance is destroyed the dentine is involved. In the other the disease begins and ends in the cement and dentine; or if the enamel be involved it is only to a limited extent. When caries begins upon the enamel of labial and buccal surfaces of the teeth, it is usually preceded by a green or brown stain, and the character of the teeth attacked is usually poor; they are deficient in calcareous ingredients, and belong to the second or third order of density.

It is customary to attribute this stain to an abnormal condition of the fluids of the mouth, especially the mucus from the follicles of the gum, and in most cases the ordinary tests for acids will show such a condition present. Whenever this stain has been present the polish has been destroyed and the enamel roughened, and a chalky appearance given to the surface of the tooth. Unquestionably the cause assigned is a correct one. Precisely the same condition may be produced in the laboratory with any of the mineral or vegetable acids. Were I asked to demonstrate it, I would call it the labial decay of childhood, or the labial decay preceding puberty. The writer has frequently noticed it and all the conditions favorable to its advancement in young girls prior to their first menstrual period. In color it is generally white; in progress rapid. It would perhaps be asserting too much to say that the secretions of the mouth were always acid when such decay is found upon the surfaces under consideration, but the tendency is always toward an acid condition, and the writer feels confident that litmus-paper would show an acid reaction in at least eighteen hours out of the twenty-four. The treatment should begin early, and may be prophylactic, mechanical, and constitutional. If the green or brown be present it should be polished away with fine powder (never scraped away with a sharp instrument), and the surface of the enamel polished as beautifully as it is possible to do with oxide of tin or fine chalk. The acid secretions of the mouth should be modified, if possible, by frequently rinsing the mouth with lime-water, and at bedtime chalk may be packed around the necks of the teeth. Lactophosphate of lime and cod-liver oil may be given in combination in digestible doses. A diet of which the phosphates form a considerable proportion cannot but be beneficial, and plenty of exercise in the open air will complete the list of constitutional remedies.

But unfortunately the dentist is not always consulted until mechanical treatment is demanded, and this generally consists in cutting out the softened tissue and filling the cavities. But what shall be the material used in teeth of this description? To fill with gold is like building upon the sand. I am free to confess that I am New Departure enough to admit that gold under such conditions would be about the worst material that could be used, not because it is gold and incompatible with tooth-structure, but because there are other materials better. Phosphate of zinc stands at the head of the list for such cases, and next is gutta-percha. Either is but temporary, but while the teeth are yet in an uncalcified condition we must be content with temporary work. Gold would be but temporary now, though it were inserted with the greatest skill. All that we can hope to do, under the most favorable conditions, is to arrest the disease and wait for nature to help us out,—and nature will often do it. The writer has often seen the disease arrest itself before caries had penetrated the whole thickness of the enamel. If children could be taken at just the right time, and as it were turned out to pasture, I doubt not in very many instances we should find the caries stopping at the junction of the enamel with the dentine. This, then, is the labial and buccal decay of childhood. It begins in the enamel, may end there, or may consume the whole tooth-crown.

But there is another character of labial and buccal decay. It begins in the cement and dentine, and can hardly be called a disease of childhood. It is preceded by a recession or absorption of the gum, and its superficial extent is often bounded by the border of the gum above and the enamel junction below. In other words, that portion of the dentine which is deprived of gum-covering softens and disintegrates. It is necessarily a disease of middle life or advanced age, but it rarely presents itself until after puberty; neither is it frequently to be seen in the mouths of those who have soft or frail teeth. I would not be understood as asserting that the decay differs in character materially from that previously described, save in that decalcification is much slower in teeth of more dense structure. The recession or absorption of the gum is the first abnormal condition demanding our attention. I am aware that the cause of this is usually attributed to the tooth-brush or to too much friction. Doubtless in some cases this may account for it, but the writer is strongly of the opinion that there is something back of the tooth-brush which causes it. Some of the most pronounced cases I have ever seen have been in the mouths of inveterate smokers, especially in the cases of young men who indulge to an almost criminal degree in the use of cigarettes. I recall several such cases in my own practice, where the gums have been absorbed to the extent of about one-eighth of an inch; the surface of the dentine softened and exceedingly sensitive to the touch. General debility or nervous prostration would seem to be another favorable condition. I have from time to time under treatment two gentlemen, neither of them over twenty-five years of age, both of whom have suffered from general debility (or nervous prostration, as they are pleased to call it), in which there has been absorption of the gums to about one-eighth of an inch in extent from around the labial surfaces of the six oral teeth. Both of these gentlemen have teeth of an uncommonly good character,—very few approximal decays,—and yet it has become necessary to cut out and fill cavities in all of these labial surfaces. The ordinary test for acid in the secretions has not shown it to be present to an unusual degree, and both of the gentlemen in question are in the habit of cleansing their teeth with ordinary care. When caries of this character attacks the teeth, at the points indicated and at the period of life named, it does not often arrest itself. Constitutional treatment may retard it, local application may keep it in check for a time, but the operation of filling generally becomes imperative. But filling does not always arrest it, except in so far as the disease has extended at the time the operation is performed. Absorption of the gums continues, softening below and around the filling follows, and in a short time a larger filling is demanded, because the disease has not been limited except by the extent of the gum's recession.

There is no class of operations which the writer is called upon to perform the result of which is less satisfactory than these. The plastics do not seem to fill the demand. Neither phosphate of zinc nor gutta-percha seems well adapted, partly because of the difficulty of making good margins near the gum-border. Gutta-percha is preferable to the phosphate of zinc for such positions, but should the upper edge of the filling impinge in the least upon the gum it is sure to produce irritation, which is followed by renewed wasting of that tissue, and the last state is worse than the first. Gold seems the best adapted for such cases, and because of the good character of the enamel tissue in teeth thus attacked it lasts better than it would do in teeth of softer structure. I would denominate this last-named as the labial decay of middle life; its cause both constitutional and local; constitutional in that there is a lowering of the general tone or stamina of the nervous system; local in that the mucous follicles are secreting an abnormal fluid,—and this, too, in consequence of a local irritation. I would preach against excessive smoking, especially the use of cigarettes. For treatment, make the best operations and direct washes of lime-water.

But the subject assigned me calls for the consideration of another condition, sometimes present upon the labial and buccal surfaces of the teeth, namely, erosion, and because it is unlike the two just described I was led at the beginning of this paper to give the subject a threefold division. That this disease is unlike the labial caries just described I am sure you will bear me witness. Authors of text-books have either passed it over in silence, or devoted as little space as possible to its consideration. Harris, in his work on "Dental Surgery," has devoted a chapter to it, consisting of less than three pages, which he denominates "Denuding of the Teeth." He does not attempt to explain the cause, nor does he more than hint at the treatment.

Garretson, in his "Oral Surgery," has devoted less than two pages to the subject, and left us as much in doubt as to the real cause as to the best mode of treatment.

Both Wedl and Magitot have devoted considerable space to the subject of erosion, but both seem to confound it with malformed or imperfectly developed teeth, and attribute it to a congenital defect or mal-nutrition while the tooth was in a follicular state; whereas almost daily observation has taught us that it occurs most frequently upon teeth perfect in development and at periods far remote from the time of eruption. It is a condition which more frequently than otherwise makes its appearance after the thirtieth year of age, and instances are rare when it has been present at so early a period in life. I need hardly enter into a description of the disease, nor need I point out in detail its unlikeness to ordinary labial caries. Suffice it to say, that it more frequently than otherwise begins upon the incisors and cuspids, though it is frequently to be found upon the bicuspids and molars. It begins by a general wasting of the enamel tissue, sometimes at or near the gum, at other times midway between the gum and cutting-edge of the tooth. Sometimes its progress is indicated by transverse grooves having the appearance of being carefully cut or chiseled. At other times the grooves are longitudinal, and at still other times there is a general wasting away of the entire labial face of the tooth. The labial and buccal surfaces are more frequently the seat of disease than are the palatine and lingual, and yet in some instances these latter surfaces are eroded.

Unlike other types of labial caries, the surface is generally beautifully polished. Teeth thus affected are generally excessively sensitive to heat and cold, and especially so to sweet and sour. It may be confined to a single tooth or to the teeth of one side of the mouth only. It is sometimes rapid in its progress, and after progressing to the depth of the enamel covering is arrested; or it may be exceedingly slow in its progress, years elapsing before great destruction of tissue has ensued.

But it is easier to describe its appearance than to ascertain the cause. Among the few that have been enumerated, the acid theory seems to be most accepted. I am aware that the great majority of practitioners are strongly of the opinion that it is a condition produced by an acid reaction of the fluids of the mouth, more especially of the mucous saliva, and that the tooth-brush and dentifrice hasten its development. Such a theory is unsatisfactory, because the conditions favorable to it are not always present; neither are they present only at the period when such destruction takes place, but at no other periods during life. While it is true that external acids taken into the mouth may cause rapid destruction to tooth-structure, by dissolving out the calcareous ingredients, and while it is also true that acids generated in the mouth by the fermentation of articles of food, or liberated by the constitutional phenomena, may account for ordinary caries in a general way, it does not prove conclusively that the disease now under consideration is dependent upon this. On the contrary, the disease is often found in mouths in which the salivary secretions have been found not to be acid but rather alkaline or neutral, and some writers have gone so far as to assert that it is caused by excessive alkalinity of the oral secretions, and is not dependent in any way upon an acid state of the saliva.

Personally I am very loath to believe that it is an acid condition of the fluids of the mouth that produces it, nor am I more ready to believe that it is a combination of acid and friction from tooth-brush and dentrifice, as some would have us believe, and for the following reasons: First, the most pronounced cases I have ever seen of it are in mouths in which litmus-paper has failed to detect the slightest acid reaction, though the test for it has been made at all intervals of the day, both before and after eating. Second, because I cannot reconcile the facts that it occurs at or about a given period in life, and almost never in youth, although the secretions of the mouth may be intensely more acid between the age of twelve and thirty than between thirty and sixty years of age. Again, if the tooth-brush is the cause of it, either wholly or in part, why is it not found upon all of the teeth which are brushed alike, but upon a single tooth or the teeth of one side of the mouth only? Why are not my teeth thus affected, since I have brushed them heroically with tooth-powder for more than twenty years, and with brushes not lacking in stiffness? Why are not the teeth of most persons who use stiff brushes and dentifrices with the same care that I do affected by erosion of the enamel? Why are so many exempt from it when the assigned or so-called causes are so common?

At the risk of exhausting your patience, I shall present two marked examples of this disease which have developed under my own observation, the history and progress of which I have noted with peculiar interest. They are interesting because of their similarity, and also because of their unlikeness to each other. Both of them are in the mouths of maiden ladies, and, as nearly as I can judge, of about the same age, say from forty-five to fifty years. One of them has been a patient of mine at least fourteen years, the other perhaps ten. The quality of the teeth of each, when I examined them, would rank among those of the first order. I cannot describe them better than by saying that they were perfect in development, yellow in color, and as clean as the teeth of a hound. The ladies themselves were fine specimens of physical health, and both of them have recently assured me that from childhood they have enjoyed uniformly excellent health. Both of them say that they have never been in the habit of indulging in acid fruits, nor have they been in the habit of eating acid food to any considerable extent. Both of them have now and have always had good digestion, and, so far as I am able to ascertain, by frequent tests of the secretions of the mouth with litmus-paper, have normal salivary and mucous secretions. Under such conditions, we would naturally expect to find comparative freedom from caries and exemption from enamel erosion; but such is not the case. They represent two of the worst conditions of erosion I have ever seen. At the time they came under my care there was no indication that such a condition was to follow; in fact, it did not make its appearance in either case until within the past five years. Let me briefly point out the similarity of the two cases, and then their unlikeness to each other. Both of them began at about the same period in life, and both have been progressing for about the same number of years. Both are single ladies, with temperaments and constitutions very much alike. The erosion has attacked the same teeth, the same surface, and has progressed to about the same extent in each case. Their unlikeness consists in the following: In one case the wasting away of the enamel and dentine-tissue has been attended with exceeding sensitiveness; in the other, none has been present. In one no softening nor decalcification of the dentine has followed, but the eroded surface is as smooth and polished as though it had but just come from the hands of a skillful lapidary; in the other the sensitiveness to heat and cold is excessive, as it is also to acids. While the surface of the enamel presents the same polished appearance, no sooner is the dentine exposed than decalcification ensues, and mechanical treatment becomes necessary. In one case the erosion is confined to the labial and buccal surfaces; in the other the wasting is general, there having been a gradual diminution of the whole crown of the tooth, the lingual, palatine, and approximate surfaces showing the same eroded condition. Fillings of gold which had been inserted and made flush with the surface of the enamel now stand out like islands in the sea, the tooth-structure having wasted away from around them. In seeking for a cause of this remarkable condition I have been baffled at every step. Each inquiry pointing to the probable cause has elicited a negative response. I have endeavored to persuade myself that it was nothing more nor less than an acid mucous saliva softening or dissolving the calcareous constituents of the tooth, and that the tooth-brush and powder did the polishing. Were the eroded surfaces the labial and buccal only, and the grooves all transverse, possibly I could do so, but when I find depressions—minute pools or basins, as it were—in the labial faces of the teeth, and these, too, most beautifully polished, I am led to believe that it is not the only cause. A remarkable coincidence has attended one of these cases, and while it may not be of value in helping us to determine anything positive, it is nevertheless interesting. When the erosion first began in one of these ladies' teeth she came to me and said, "See how my teeth are wasting away, and see also how gray my hair is getting. All this has taken place within the last few months." She had consulted the family physician, who is a Walnut-street practitioner and a gentleman of great prominence in the city. He said to her, "There is no lime in your system," and at once put her upon lacto-phosphate of lime and cod-liver oil; and now, whether he had made careful analytical test ot her excretions, to determine if undue quantities of lime were being eliminated from her system, I did not ask, neither did I learn; but may it not be possible that the wasting of the tooth as indicated is owing in part, if not wholly, to a lack of lime-salts in the system? Speculation is not proof, but speculation may help us to discover facts, and, in seeking to find a satisfactory explanation of this remarkable phenomenon, I have sometimes wondered whether it might not be caused by excessive calcification of the tooth-substance. It does not come in childhood, when the tooth has a large percentage of animal matter in its composition; neither does it come in youth, but usually in middle life and in teeth of the best quality. May it not be possible that nutrition has ceased to reach the periphery of the dentinal tubes, and petrifaction has taken place? I am aware that such an argument has its weak point, because devitalized teeth are not proof against it.

A few words with reference to the treatment, and I have finished. Eroded surfaces are sensitive and need treatment. The best treatment would be the galvano-cautery, touching the eroded surface until sensation has abated. Nitrate of silver often gives relief, if applied faithfully and continuously for several minutes at frequent sittings. Chloride of zinc, applied repeatedly, will give relief. When softening of the dentine follows the erosion of the enamel, filling becomes necessary. I have been more successful with gold in such cases than with any of the plastics, but fillings protect only the point filled; the disease is only arrested at the place occupied by the filling. Whether constitutional treatment will avail anything, I am not prepared to say.

Finally, gentlemen of the Odontological Society of Pennsylvania, I propose for your consideration this evening the riddle of dentistry: Erosion of the teeth; the cause and best treatment.

Discussion.

Dr. Kirk. I have had two cases of erosion lately which are of interest; both patients were ladies and sisters, with a difference perhaps of five years in their ages, the elder not over thirty-five years. The teeth of both were extensively affected by the disease, but the manifestation of its action was different in each case. Those of the younger sister, from and including the first bicuspid on the left side to and including the same tooth on the right side of the superior jaw, had deep concave depressions upon their labial surfaces at the necks, which in several instances extended to the approximal surfaces. Had it not been for this fact, and that small gold fillings were standing in the center of several of the depressions, from which the surrounding tooth-structure had dissolved away, leaving the gold high above the surface of the tooth, I should have attributed the condition to the abrasive action of brush and tooth-powders used too vigorously. Upon examining the lower teeth I found the incisors and cuspids affected in the same manner; the disease in the centrals extending over a considerable portion of their approximal surfaces, thereby excluding the possibility of abrasion from the brush. There was no evidence of any erosion upon the teeth posterior to the first bicuspids. There was slight carious action in a few of these polished depressions, which the patient insisted upon having filled with oxychloride of zinc filling. This I declined to do, believing that the secretions of her mouth must be acid. To assure both her and myself of the fact, I tested the saliva and the secretions about the necks of the teeth with Squibb's litmus-paper, and to my great surprise found both neutral, or if anything slightly alkaline. The cavities I filled with gutta-percha, the preparation of them causing very little pain. Upon questioning the patient as to the character of her food, and especially as to her fondness for acids, she acknowledged a strong partiality for food of this character, stating that it had been her habit for years to eat one or two sour oranges at bed-time; otherwise her diet was in no way peculiar. She was of a very highly-organized nervous temperament, and an almost constant sufferer from neuralgia. In the case of her sister the erosion presented a different appearance; the six upper front teeth looked as though their labial surfaces had been held against a grindstone and the enamel ground down as thin as tissue-paper and highly polished. The enamel upon the approximal surfaces was of normal thickness; the appearance presented being much the same as viewing the teeth in longitudinal section. Upon the labial surfaces of the cuspids, which were much flattened, having lost their convexity by the removal of enamel, a polished groove extended from the gum-margins to the cutting-edges in a tortuous line, which was entirely denuded of enamel and exquisitely sensitive. The first bicuspids each had grooves of erosion extending transversely across their necks. In the few instances where I have met this condition before I have found gold fillings more satisfactory than anything else, but have never seen or treated a case of erosion so extensive as these before, nor in any instance have I ever seen it in a patient under thirty years of age.

Dr. Jack. I have met with three characteristic cases differing from any of those cited by Dr. Darby,—one being an example of true enamel erosion; one a peculiar form of erosion on the approximal surfaces of a cuspid and a central incisor, and the third an apparent erosion of the cutting-edges of the upper and lower incisors. The first case, at the commencement of the disorder, presented the appearance of a number of small pits, scarcely larger than the section of the shaft of a dressing-pin, on the face of a central incisor, and more highly polished than the surrounding enamel. They gradually grew larger until two grooves were completely established, and at last in the progress of the case they formed one broad line of erosion. Meanwhile other points were forming on other parts of the front teeth. This case is a typical one of true enamel erosion, on account of the spots being isolated, comparatively round, and highly polished; the effect of abrading influences being excluded; in but few points had the dentine been reached. The high polish of these depressions is a feature peculiar to enamel erosion, and an apparently anomalous phenomenon, since all other acidulous processes of solution of dental structure present dull and roughened surfaces. Loss of substance from the necks of the teeth, where the cementum has become exposed, may be the result of abrasion, and not due to this peculiar manifestation, which needs to be eliminated to enable the etiology of this affection to be determined with accuracy.

The second case was an exception to the usual surfaces affected. The eroded parts were very smooth, but afterwards became carious.

In the third case the destruction was limited to the ends of the teeth, and increased until a space as large as the thickness of the index finger resulted between the ends of the upper and lower incisors. These surfaces were not smooth, and, while not at all carious, were dull; though not irrregular, were like frosted glass or a metal bitten by an acid. In this case the solving influence was probably an acid mucus secreted by the follicles at the tip of the tongue, and enhanced by the habit the patient acquired of constantly applying the tongue to these surfaces.

Erosion has been attributed to the influence of the gouty diathesis. I believe this to be the case, since in nearly every instance of enamel erosion I have not failed to establish the existence of a tendency to gout. Charles Tomes states that the otaria are subject to the erosion of their teeth.

Dr. C. A. Kingsbury. For many years I have been greatly interested in the subject so ably presented in the paper read to us this evening. My own observation fully confirms in many respects the facts stated. I have noticed that the incisors and cuspids are the teeth more frequently affected, but have met with the disease in many cases in the bicuspids and first molars. The erosive action is generally confined to the labial and buccal surfaces, forming grooves of a varying depth in a transverse direction and near the margin of the gum. I have seldom met with instances in which it has produced grooves in a vertical direction. In some cases there is considerable sensitiveness present on touching the denuded surface with the point of an excavator; but this is not generally the case until the disease has nearly exposed the pulp, and even then I have noticed that a reparative process has evidently been going on for the protection of the pulp by the formation of secondary dentine, or consolidation of the dentinal tubuli. In rare cases I have met with erosion upon the lingual surfaces of the inferior teeth. I have met with it upon the grinding surfaces of the cuspids, bicuspids, and molars, cupped out by loss of substance, and not due to mechanical abrasion in mastication, but to a process nearly if not exactly similar to that upon the labial and buccal surfaces.

I have no doubt that abnormal secretions, both salivary and mucous, having a decided acid reaction, as well as the various acids, such as lactic, acetic, and others, generated in all forms of indigestion, are important factors in producing erosion. In conjunction with these chemical agents we have a mechanical agency at work in the abrading and polishing friction of tooth-brushes and coarse dentifrices. But all these causes combined would not be sufficient to produce such effects if there was not some radical organic defect in the structure of the hard tissues. This is not only manifest in teeth of different individuals, but also in different teeth of the same individual; we also find a marked difference in the structure of the calcareous tissue of the same tooth, some parts of the crown being hard and perfect and other parts defective and imperfect. We have reason to believe that the process by which the carneous pulp with its soft cellular tissue is transformed by the deposition of lime-salts into dentine and enamel is liable to be seriously affected by systemic influences exerted through the circulation. This disturbance of the function of nutrition, by the vitiated secretions of the blood during their formation, would enable us to account for most of the histological abnormalities to be found in the human teeth.

In ordinary cases of erosion, however dense and normal the appearance of the dentine may be, this deficiency in organic structure, whether in the quantity, quality, or arrangement of the constituent elements, renders them more soluble by the acids present in the oral cavity. The treatment indicated in such cases is filling with gold,—which is the most reliable in the majority of cases,—gutta-percha, or oxyphosphate of zinc; the use of a weak solution of bicarbonate of soda or lime-water as a gargle two or three times a day, and the employment of pure precipitated chalk as a dentifrice.

Dr. Chupein. I never believed that erosion was produced by the tooth-brush. The grooves are too narrow to be made in that way. I have always noticed it in teeth of the densest character. Its cause has always been a mystery to me. I cannot think that erosion is first produced by an acid action and the surface polished, as we always find it, by the action of the lips or by tooth-brush. If this were so we should find all the teeth acted upon alike, whereas we find erosion greatest in the incisors and cuspids, and seldom extending as far as the second molar. I have a specimen of erosion in a lower incisor, with the groove on the labial surface, while the lingual surface is so thickly coated with salivary calculus as to obliterate all shape of the tooth. I never saw a case of erosion of greater width than three-sixteenths of an inch nor of greater depth than one-eighth. When speaking upon this subject some time ago, the late Prof. Buckingham stated that he had a patient who never used a tooth-brush, and yet his teeth were eroded from the molar of one side to the molar of the other; furthermore, he said he had seen cases of this kind where an upper lateral incisor closed inside of the lower teeth, being entirely out of the reach of a tooth-brush; and yet this lateral incisor was as deeply eroded as the prominent central incisor and cuspid which flanked it on either side.

Dr. Guilford. I am very much pleased with the paper, especially with its full and complete statement of the condition of this peculiar lesion, but am disappointed in not hearing more as to its probable cause. Its symptoms are familiar to every practitioner, from the numerous cases we are called upon to notice in our practice. The attack is upon living teeth almost exclusively. Where it is found upon devitalized teeth, it has probably taken place before the teeth lost their vitality. While the grooves are mostly longitudinal, they are sometimes vertical and sinuous, appearing variously at any point between the cutting-edge and gum. All these peculiarities of location and condition must be met and explained by some theory to make it generally acceptable. For my own part, I have always been a believer in the chemico-mechanical theory. I cannot see how anything but an acid or combination of acids can dissolve so hard a tissue as the enamel; and since the action of an acid would leave the eroded surface rough, while we find it smooth and polished, I fail to see how this polishing could occur save by mechanical means in the use of the tooth-brush. Now, what this acid or acids may be I cannot say; careful chemical and microscopical investigation can alone determine it, and this has not yet been undertaken.

Attempt has been made to associate it with kidney troubles, and it may be that under such conditions an unusual quantity of uric acid is generated in the system, and that the damage is done by it. To establish this association, however, we must determine by experiment the presence of uric acid in inordinate degree in the fluids of the mouth, and then it must be explained why it should occur in greater quantities in the region of the superior and especially the oral teeth.

It appears to me, also, that the condition cannot be constitutional and operative through the structure of the tooth from within outward, as some have endeavored to maintain, for it would then operate on all the surfaces of the teeth alike, as we know it does not. Whatever the cause of the lesion may be, it is certainly one of the most alarming conditions that we meet with, because we can neither explain its character nor suggest a plausible remedy.

Dr. Leech. I saw a case of a molar affected by erosion on the palatine side, the groove being quite deep and highly polished, which certainly could not have been done by the use of a brush or toothpowder.

Dr. Kirk. I would like to ask if true enamel erosion ever occurs in pulpless teeth?

Dr. Darby. I have had one case where erosion took place after the pulp was devitalized.

Dr. Truman. In order to understand this subject it is necessary to review the conditions that existed in the mouth subsequent to the entrance of the saliva in the oral cavity. It is well known that alkalinity is the normal condition of the saliva, but this does not exist when combined with the other secretions. It then gives a neutral reaction. In a long course of testing I have never met with an absolutely acid reaction. Now, it is to this neutral character that we must look for a reasonable explanation of caries as a whole, and of abrasion in particular. Neutral solutions rapidly change to acid if they are given proper conditions. During the hours of greatest activity, when the flow of saliva is constant through and around all portions of the mouth and teeth, there is little or no change, and test will not give any decided response of acidity anywhere. These well-known facts have led many to suppose that the destruction witnessed was not a chemical change, produced by acid solution, but probably an alkaline action. That this view was and is an erroneous one is clearly evident from the fact that no change occurs in teeth immersed in the strongest alkalies, the inorganic material and basis-substance remaining unaffected by months of immersion.

These undisputable facts render it necessary that we should examine further, and trace if possible the change that takes place in the secretions some time in the twenty-four hours. The alkaline theory is untenable. The idea that there is some interior destructive action going on is equally unreasonable. Decalcification is always a change produced by chemical means. These abraded teeth are dense teeth, more than ordinarily so, and there is no evidence that this action could by any possibility originate by and through the tubuli of the body of the tooth. It is an external action, and the cause must be looked for in the fluids that environ the teeth. Now, we know that these furnish no satisfactory explanation during the active period of life. Is there anything to be learned from a period less active, or one of entire rest? Now, it is well known that the flow of the secretions is markedly lessened at night during sleep; in fact, the extreme dryness is oftentimes unpleasant, giving the whole mouth a parched feeling. The alkaline saliva enters the mouth in but small quantities, not nearly sufficient to neutralize the acid generated, and the result is that, if tests are made at the moment of awakening, the acid reaction is marked. Hence it is evident that the destruction of teeth principally occurs at night. The entire mouth is in a state of rest. The fluids collecting before retiring in all depressions between the teeth on approximal surfaces, on the labial portions where the lips rest against the teeth, and in all pits or pockets, there is destruction going on silently but surely. It may be asked, How do any escape if these statements be true? Very few indeed escape caries,—perhaps none. Some do escape up to middle life, for it is about this period and later that the greatest evidences of erosion are manifested. It must be remembered that about this time there is an evident change in the secretions, and doubtless increased acidity at night; though this has yet to be experimentally demonstrated as existing to a greater extent after middle life than in younger years.

The conclusion is that abrasion is a purely chemical action, produced by acid secretions, and promoted by contact of the soft tissues, as the lips on the anterior teeth.

The highly polished surface may be explained by the constant action of the lips and articles of food. It is precisely the same as the polish of so-called eburnated dentine, where that clearly originates in constant attrition. In regard to Dr. Kirk's illustration, it would seem as though the eating of the orange before retiring invited the very conditions necessary to acidity and destruction during the sleeping hours.

In the case mentioned by Prof. Darby there was evidently no exactness in testing. Unless this was done at the proper moment, the results would be of no value. As soon as the parts arouse to action the secretions resume the character normal to day-time by the increased inflow of the saliva.

Dr. Jack. The cause is probably the acidity of the mucous secretions of the lips and gums. Its neutralization in the back part of the mouth by the alkaline saliva of the parotid glands may limit the disease to the eight or ten front teeth. In the same manner the general salivary contents of the mouth may limit its extension towards the approximal borders of the labial surfaces of the front teeth.

Dr. Guilford. I am glad to see that Dr. Jack at last comes around to the acid theory.

Dr. Jack. While the application of these general principles throws some light upon the cause of this peculiar disease, which fortunately is not a common one, still I think it yet remains inexplicable in the present state of our knowledge.

Dr. Kirk. In the mouth of one of the cases which I cited was a molar filled with one of the basic zinc-oxide fillings, with no evidence of disintegration, and which had been inserted previous to any appearance of erosion. This to my mind would exclude acids as a cause, the existence of such fillings being incompatible with an acid condition of the oral secretions.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The First District Dental Society of the State of New York held a regular meeting on Tuesday, May 1, 1883, at 8 o'clock P.M., the president, Dr. A. L. Northrop, in the chair.

Dr. J. F. P. Hodson read a paper on "Crystal Gold," * after which occurred the following discussion:

Discussion.

Dr. F. A. Roy. I would like to ask Dr. Hodson if such fillings can be put in entirely by hand-pressure, as with cohesive foil, and be as solid as though malleted.

Dr. Hodson. I may say that, from a mere theoretical stand-point, I should suppose that a more solid filling can be made by hand-pressure with crystal gold than can be made with cohesive foil, in consequence of the application of force being made to smaller surfaces with the former.

Dr. ——. I used crystal gold exclusively for five years. I think we can fill cavities with crystal gold with more certainty of well-doing than we can with cohesive foil. The preparation of the cavity is important. I had the pleasure of seeing, last winter, two lower molars on each side that were filled (the crowns being almost entirely restored) with crystal gold in 1866, the work being done without the use of the rubber-dam, and it shows well to-day, having a clear margin, as though recently inserted. For those two fillings I got a higher price than I ever had charged; I got $25 for one and $35 for the other. They have lasted since 1866, and they are good to-day.

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* See DENTAL COSMOS for August, 1883.

Dr. Rynear. My preceptor, Dr. Loeffler, placed in my mouth some eighteen years ago twelve gold stoppings, all of which were made with crystal gold. When I began the practice of dentistry I used crystal gold. I thoroughly agree with what Dr. Hodson said; yet at the same time there are some reasons for preferring gold foil. I believe that more difficult operations, more excellent contour work, and more perfect margins can be accomplished with gold foil than can possibly be done with crystal gold.

Dr. ——. About twenty years ago I used crystal gold quite extensively. I do not say that it cannot make a good filling, or that I did not make some good fillings with it; but, in my hands, it was very much more uncertain than any other form of gold that I ever used. I think it is more difficult to use than foil. Around the margin it turned dark, and the filling leaked when I had thought it was as solid as could be. That is the cause of my abandoning crystal gold. I used it very extensively at one time, but for the last twelve years I do not think I have used any of it. The first tooth I ever built in the mouth was done with Watts's crystal gold. Some of my crystal gold fillings are standing yet and doing well, but the majority of them I have removed and put foil in their places. Perhaps I do not know how to use it; but I certainly think that we are more easily deceived with it than we are in using foil; and dentists who cannot use crystal gold and make good fillings can make good fillings with foil.

Dr. Rynear. The fillings put in my mouth by Dr. Loeffler are still, I am satisfied, in excellent condition; nevertheless I give the preference to gold foil.

Dr. Abbott. I think that Dr. Hodson, in his paper, has not stated any more than he can do with crystal gold. I think that any man who will work crystal gold as carefully as Dr. Hodson does can accomplish just as good results as he does. The fillings made with it are elegant, but the work is a little slower than it would be with foil when using them in the same kind of an operation. Some fourteen years ago I used crystal gold quite extensively. For two years I did no operation except with that form of gold. I found, however, that with students in the college it was very difficult to get more than one or two, perhaps, in a class of fifteen or twenty, who would use that gold as carefully as is necessary. And then, as Dr. Hodson has said, the instruction we received previously in reference to the manner of using crystal gold was such as to mislead,—so much so that men would make failures. They would take a large piece of gold, which would catch upon the side of the cavity as they were trying to introduce it, and the instrument would punch a small piece out of the larger one, which would become a little ball of gold in the cavity, remaining in the granular state and never uniting again with the filling proper. That is the case now, notwithstanding the fact that the gold has been much improved. In giving instructions to the class in reference to the use of crystal gold, I find that there are certain points necessary to be observed. First, the pieces should be so small that they will be carried directly into the cavity without impinging upon its sides; second, carry it to the spot in which you wish to condense it before you commence condensing. When condensed properly, I have no doubt that crystal gold makes as perfect a filling as can be made with any other material; but it will take more time and attention than cohesive foil. I do not buy the cohesive foil; I buy soft foil and warm it, which makes it very much like cohesive gold; but it retains the same kid-like property which it had before I warmed it. So I get it into its place readily, and in larger pieces than I could with cohesive foil. The fact is that gold sticks so tightly, one particle to another, that if the pieces are large they coalesce to each other in such a way as to become *cranky*, and it is impossible to condense it in the cavity without endangering the tooth. It would burst the side of the tooth out before the center of that mass of gold would become thoroughly condensed. I have seen dentists put in pieces of it as large as a very large pea, and attempt to condense it by hand-pressure, which would be impossible to do. I have seen that work stand for fifteen or twenty years, put in without the rubber-dam or anything of the sort; I have seen large crowns built up with crystal gold, which could hardly have been done with anything else, and all done by hand-pressure. The doctor has said that the work of Dr. Dwinelle, many years ago, in restoring the crowns of teeth as he did, was something marvelous, and it is marvelous how it is standing to-day.

Dr. La Roche. I have a form of gold that is not new. It is known to many who are here. I will describe it, and you can pass it around. It is for sale at White's depot. That is No. 40. There are ten sheets of No. 4 foil laid on each other; it is then cut in strips of different widths, and those strips are cut in two, sometimes four, pieces. There being ten sheets together, it makes it the same as heavy gold, No. 40. It will be found to work much better and with more certainty than heavy foil. Dr. Bödecker and the late Dr. Webb have used it.

Dr. Atkinson. Mr. President, there has been scarcely a thing said by Dr. Hodson that, from his stand-point, is not exactly true. The probability is that individual opinions will always vary as long as they remain only opinions. But we claim to have something better than opinions, something in the shape of knowledge, that is capable of being communicated from one mind to another by proper vehicles. I was impressed with the lack of earnest spirit on the part of those present when a question of such deep importance as this is broached. The weak point in the paper to-night is the ignoring of the best thing that has ever come within the range of our practice in filling, and that is to have some non-conducting material that shall occupy the principal part of the cavity, using only enough of gold to afford strength to the tooth and complete the restoration of its contour. That is all we need gold for,—for restoring the outer contour and to offer resistance to chemical agents and mechanical abrasion. We are too much inclined to rest upon past experience; having gone three or four steps in the way of progress, we have accepted that as a finality, and not gone on as we should do.

So far as his mechanism is concerned, I esteem Dr. Hodson highly, but so far as principles of filling are concerned, his ideas are like Professor Abbott's cavities,—they are full of holes. To punch pieces in that would not adhere to the rest was not a very coherent arrangement. *I* would say, first remove whatever of the tooth-substance is necessary to get a good margin to your cavity; then, if the cavity is large, put in some non-conducting material,—and nothing is better than oxyphosphate of zinc; when that has hardened, cut away the natural tooth-substance far enough to get a good anchorage for gold; then build up until you get the contour of your tooth complete, and you can finish it with any form of pure gold, if you have any genius. Without saying that you should use foil, or crystal gold, or this, that, or the other method of doing it, the object is to so place the molecules of gold against each other that there shall be nothing between them. That is all there is to it. If you can make it solid, you may certainly depend upon its working satisfactorily. If you cannot make it solid, then you will have it all full of interstices, as is the case with a great many fillings. After they are removed put them over the flame of a lamp, and they will give to your nostrils sufficient evidence that they are not solid material. My preference is for heavy foil gold, that has never been reduced by alloy. If you have ten sheets of No. 4 to make No. 40, you have nine spaces between them which must all be annihilated by welding; and there is more force required in annihilating those spaces than in welding two sheets of No. 40, which would make No. 80. If you put gold to a certain degree of heat it will not lose its adhesiveness. Dr. Abbott said, warm it; that is a good idea.

Dr. Hodson. I recognize but one point in what Dr. Atkinson has said to which it is necessary for me to make any reply, and that is the result of a misconception of my paper. I not only advocate the filling, largely, of the interior of cavities with a non-conducting material, but I do it myself. My paper was designed simply to remove some misapprehension in regard to crystal gold. I fill the interior of cavities in teeth to a considerable extent with other materials than gold; oxyphosphate of zinc principally, wherever I am able to do so, particularly where the walls of the cavity are thin. I also build the gold up around screws inserted in the roots of the teeth. I presume I use it in quite as many ways as other gentlemen do cohesive foil.

Dr. La Roche. Dr. Hodson says he fills with other material besides gold, in the same cavity. I think that is where dentists are now making great mistakes. It is right to use some other material, but dentists are using too much in one cavity; they are putting too much non-conducting material between the gold and the bone. I have seen it in many cases among my patients who had been operated on by gentlemen not in the city of New York; they said they did it that way because they could not afford to fill cavities entirely with gold; it was too dear. In my practice, within a few years, I have noticed a great many failures made by putting in too much non-conducting material in fillings; we do not get a good gold filling over it. Another thing, about becoming a good, first-class operator; it strikes me that there is more to be looked at than the material. I have seen operations done that looked very nice when finished; but the preparation of the cavity and the quality of the tooth were not taken into consideration. There is where young operators make a mistake. You want to get a good, secure wall, and don't be afraid to cut away the tooth to get it. A thin, wedge-shaped wall is very destructive to fillings, and breaks off very frequently when the operation with the metal has been tolerably well performed. The mistake has been in the preparation of the cavity.

Dr. Spooner. I have seen, within a short time, a case where oxyphosphate was put into the cavity and amalgam over it, and the shrinkage of the amalgam had exposed the phosphate, which had become disintegrated, so that the amalgam fell clear to the bottom of the cavity. It is a case which shows that where the phosphate is exposed, or is imperfect at the top, it demoralizes rapidly. The acids of the mouth act upon the phosphate and the filling is destroyed.

The President. Is the doctor sure that it is an acid, and not an alkali?

Dr. Spooner. An acid in some mouths.

The President. Will an acid affect the filling equal to an alkali? Are the mouths in which the phosphate is cut away acid mouths, or are they alkaline mouths?

Dr. Spooner. That you can hardly tell; but it is either an alkali or an acid.

Dr. Bödecker. Gentlemen, I beg to differ with Dr. La Roche. Dr. La Roche says, as well as Dr. Spooner, that the saliva has an action upon the oxyphosphate beneath the metal filling. I have never seen it. I think that if the gold or amalgam filling has been well inserted, however thin it may be over the oxyphosphate or oxychloride filling, the latter will never deteriorate; at least I have never seen it. Wherever I can employ oxychloride or oxyphosphate under metal I do it, even in the lower bicuspids, where sometimes the space is so extremely small; in the majority of cases I use oxychloride of zinc for a protection to the dentine. But, whatever I use, I generally varnish the walls of the cavity with a solution of gutta-percha in chloroform; and I have never seen a single failure, as long as I have been using it.

Dr. Miller. Does Dr. Bödecker mean oxychloride or oxyphosphate of zinc?

Dr. Bödecker. As the case may be. Sometimes I use one, some times the other. I prefer oxychloride for one reason, and that is because it sets in a little shorter time.

Dr. La Roche. Does Dr. Bödecker find that oxychloride destroys the vitality of the tooth?

Dr. Bödecker. I have never found it to do so, if I varnish the cavity with a solution of gutta-percha in chloroform. I first dry the cavity thoroughly and apply absolute alcohol; then wipe out the cavity and varnish it with a solution of gutta-percha; then put the oxyphosphate or oxychloride right over it.

Dr. ——. Some allusion has been made to the dissolving of oxyphosphate and oxychloride of zinc under an amalgam filling, and the question was raised as to whether an acid or an alkali dissolved it. I would like to ask if an alkali is ever found under those circumstances, or if it could be. The point I make is, that when there is fermentation of the secretions of the mouth, under those circumstances, there is never an alkali present.

Dr. Atkinson. The worst fermentation that occurs is alkaline from the use of mercury; but that does not caüse a dissolution of the tooth-substance. I am in accord with Dr. Bödecker when he says he does not conceive it possible that an oxyphospate or oxychloride lining will disintegrate under a metal filling if it has been well sealed up. I can conceive that oxychloride might be destroyed by an acid; but what acid is it?

Dr. Rynear. Many years ago I made a practice of washing my cavities out with alcohol. I have long since discontinued it, and it was from the apprehension that I was doing some injury, without knowing what that injury was. I noticed under my stoppings a bluish tinge, as if there was a leakage. Since I have discontinued the use of alcohol in that way I have never seen anything of the sort, but during my use of it I did notice that bluish tinge. Has any gentleman present had any such experience in the use of alcohol in washing cavities?

Dr. Bödecker. I have used absolute alcohol for a number of years, and I have never noticed any difference in the appearance of the teeth. I do not know what change it would make, except to coagulate just a little bit of the ends of the dentinal fibers. Of course I would not use alcohol upon an exposed pulp, but if there is a sufficient covering to the pulp I should, decidedly, wash out the cavity with absolute alcohol. It abstracts all the moisture, and cleans the cavity of all particles that may remain from the saliva. Before I fill a cavity with gold, after washing it with alcohol, I always take a piece of cotton and wipe around the tooth, so that in case the gold shall touch the edge of the tooth it shall not be soiled. I think it a very good plan.

The society then adjourned.

James E. Dexter, *Secretary.*

CENTRAL DENTAL ASSOCIATION OF NORTHERN NEW JERSEY.

At the annual meeting of the Central Dental Association of Northern New Jersey, held at Orange, N. J., February 18, 1884, the following officers were elected for the ensuing year:

Frederick C. Barlow, president; G. Carleton Brown, vice-president; B. F. Luckey, secretary; Charles A. Meeker, treasurer; S. C. G. Watkins, W. P. Richards, James G. Palmer, R. M. Sanger, and G. C. Brown, executive committee.

B. F. Luckey, *Secretary,*
Paterson, N. J.

SOUTHERN DENTAL ASSOCIATION.

The Southern Dental Association will hold its sixteenth annual meeting in the city of Lexington, Ky., commencing the first Tuesday in May, 1884.

Ample arrangements have been made by the executive committee with railroads and hotels (with headquarters at the Phœnix Hotel) for reduced rates, etc. The meeting promises to be one of unusual interest. The location is one of the most attractive in the State of

Kentucky. Professional brethren who are interested in the advancement of dental science are cordially invited to be present.

W. H. Hoffman, *Recording Secretary*,
Gastonia, N. C.

FIFTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The Fifth District Dental Society of the State of New York will hold its sixteenth annual meeting at the Butterfield House, Utica, N. Y., on Tuesday and Wednesday, April 8 and 9, 1884.

Applications for membership in the society should be made on or before the day of meeting to the chairman of the board of censors, or the recording secretary. The board of censors will be in attendance to examine candidates for admission to the society.

Members of the profession from other societies are cordially invited to be present and take part in the discussions.

G. L. Curtis, *Recording Secretary*,
Syracuse, N. Y.

IOWA STATE DENTAL SOCIETY.

The twenty-second annual meeting of the Iowa State Dental Society will be held at Council Bluffs, Iowa, on the first Tuesday in May, 1884.

Efforts are being made for a reduction in railroad fares and for a profitable meeting.

J. B. Monfort, *Secretary*,
Fairfield, Iowa.

GEORGIA STATE DENTAL SOCIETY.

The sixteenth annual meeting of the Georgia State Dental Society will be held at Atlanta, Ga., on the second Tuesday in May, 1884.

The State Board of Dental Examiners will also meet at the same time and place.

L. D. Carpenter, *Corresponding Secretary*,
Atlanta, Ga.

MAD RIVER VALLEY DENTAL SOCIETY.

The annual meeting of the Mad River Valley Dental Society will be held in the parlors of the Phillips House, Dayton, Ohio, May 20, 1884, commencing at 10 A.M., and holding sessions during the day and evening.

W. H. Sillito, *Secretary and Treasurer*.
Xenia, Ohio.

NEBRASKA STATE DENTAL SOCIETY.

The eighth annual meeting of the Nebraska State Dental Society will be held in connection with the Kansas State Dental Society, at Hiawatha, Kansas, May 6, 7, 8, and 9, 1884.

W. F. Roseman, *Secretary*,
Fremont, Neb.

ALABAMA DENTAL ASSOCIATION.

The fifth annual meeting of the Alabama Dental Association will be held in Birmingham, Ala., commencing Tuesday, April 8, 1884, and continuing four days. A full attendance is requested, and members of the profession generally are invited to be present.

The State Board of Dental Examiners will meet at the same time and place.

E. Wagner, *Secretary*,
Montgomery, Ala.

TEXAS STATE DENTAL ASSOCIATION.

The fourth annual meeting of the Texas State Dental Association will be held at San Antonio, Texas, beginning Tuesday, April 29, 1884, and continuing three days. The change in date has been made to accommodate members wishing to attend the meeting of the Southern Dental Association.

George M. Patten, *Corresponding Secretary*,
Palestine, Texas.

MISSISSIPPI STATE DENTAL ASSOCIATION.

The next meeting of the Mississippi State Dental Association will be held at Jackson, Miss., on the first Tuesday in June (3d), 1884.

E. E. Spinks, *Corresponding Secretary*,
Meridian, Miss.

BALTIMORE COLLEGE OF DENTAL SURGERY.

The forty-fourth annual commencement of the Baltimore College of Dental Surgery was held at the Academy of Music, Baltimore, Md., on Thursday, March 6, 1884, at 1.30 o'clock p.m.

The annual oration was delivered by Pembroke Lea Thom, Esq., and the valedictory address by William H. Ross, D.D.S.

The number of matriculates for the session was eighty-eight.

The degree of D.D.S. was conferred on the following graduates by Professor R. B. Winder, dean of the faculty:

NAME.	RESIDENCE.
R. A. Armstrong	Pennsylvania.
C. S. W. Baldwin	New Jersey.
F. C. Barlow	New Jersey.
A. R. Begun	Iowa.
Frank Boyette	North Carolina.
G. R. Brown	Maryland.
E. S. Carroll	Pennsylvania.
T. G. Carroll	Maryland.
Price Cheaney	Texas.
Wm. Crenshaw	Georgia.
A. S. Dabney	Kentucky.
Charles Diedel	Virginia.
M. H. Dodge	New York.
J. F. Dowsley	Massachusetts.
J. C. Duncan	Pennsylvania.
A. G. Finney	Maryland.
T. M. Fletcher	Arkansas.
A. H. Fox	New York.
F. P. Hamlet	New York.
H. W. Keidel	Texas.
Wm. T. Kelley	Maryland.
J. D. Lanier	Georgia.
I. E. Larrick	Virginia.
C. A. Meeker	New Jersey.
W. C. Mence	London, Eng.
Wm. A. Montelle	Maryland.
A. O'Daniel	North Carolina.
H. A. Parr	New York.
P. P. Ritter	Pennsylvania.
W. H. Ross	South Carolina.
T. H. Schaeffer	Maryland.
G. H. Slyfield	Illinois.
Dwight Smith	New York.
C. A. Timme	New Jersey.
F. A. Twitchell	Massachusetts.
J. A. Van Orsdel	Pennsylvania.
W. W. Walker	New York.
Whyte Ward	Louisiana.
J. A. Webb	Maryland.
G. W. Whitsett	North Carolina.
J. L. Williams	Connecticut.
T. P. Williams	Texas.

OHIO COLLEGE OF DENTAL SURGERY.

The thirty-eighth annual commencement of the Ohio College of Dental Surgery was held at College Hall, Cincinnati, Ohio, on Tuesday evening, March 4, 1884, at 8 o'clock.

The annual address was delivered by Frank A. Hunter, D.D.S., and the class oration by O. F. Lambertson, D.D.S.

The number of matriculates for the session was fifty-three.

The degree of D.D.S. was conferred on the following graduates by G. W. Keely, D.D.S., president of the board of trustees:

NAME.	RESIDENCE.
B. E. Burger	Michigan.
Wm. L. Campbell	Illinois.
H. G. Chase	Indiana.
W. N. Dorward	Illinois.
G. B. Dillon	Illinois.
Theo. Erfort	Illinois.
E. E. Holloway	Ohio.
John W. Huston	Pennsylvania.
O. F. Lambertson	Nebraska.
A. H. Morey	Ohio.
Jesse Magee	Indiana.
J. C. McCormick	Ohio.
H. N. Renner	Ohio.
Carl H. Seeger	Wisconsin.
Oscar H. Simpson	Missouri.
Frank H. Smith	Pennsylvania.
B. Warder Shotwell	Ohio.
Edgar H. Wright	Pennsylvania.
Frank M. Williams	Colorado.
G. W. Williams	Kentucky.
W. J. Zinn	Kentucky.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

The twenty-eighth annual commencement of the Pennsylvania College of Dental Surgery was held at the American Academy of Music, Philadelphia, on Thursday evening, February 28, 1884, at 8 o'clock. The valedictory address was delivered by G. L. S. Jameson, D.D.S., and the address to the graduates by Professor J. Ewing Mears, M.D.

The number of matriculates for the session was one hundred and thirty-nine.

On account of the illness of Dr. S. D. Gross, the president of the faculty, the degree of D.D.S. was conferred on the following graduates by Hon. Judge W. S. Peirce:

NAME.	RESIDENCE.
Laurence C. Anderson	Mississippi.
George S. Andrews	New York.
Thomas Ashton	Pennsylvania.
William L. Bacon	Virginia.
Maria K. Benkard	Germany.
E. R. C. Blackburn	Pennsylvania.
C. Curtis Coffee	Ohio.
George W. Cupit	Pennsylvania.
George Culbertson	Pennsylvania.
Marie D. C. Dalmer	Germany.
Vasco A. Da Silva	New York.
Fremont D. Davis	Ohio.
Heinrich Deutschmann	Germany.
William P. Dickinson	Iowa.
J. Frank Dougherty	Ohio.
Sophie E. Feltwell	Pennsylvania.
Alexander L. Foerster	Pennsylvania.
August Gassner	Germany.
A. M. Green	Pennsylvania.
Hermann Gutzwiller	Switzerland.
A. W. Hafer	Pennsylvania.
James J. Hamilton	Pennsylvania.
Louis Haubeil	Germany.
Ferdinand Hegemann	Germany.
Edwin H. Hewit	Wisconsin.
Kurtz P. Hill	Pennsylvania.
Pantaleon Hoyos	U.S. of Colombia.
Parker B. Hunt	Pennsylvania.
G. L. S. Jameson	Canada.
George A. Jarvis	Michigan.
Geo. Norman Johnson	New Hampshire.
Arthur S. Kniffin	New Jersey.
Wilhelm Koehncke	Germany.
P. A. Ladmore, L.D.S.	England.
Hugh J. Laird	Pennsylvania.
Henry Leffmann, M.D.	Pennsylvania.
Alex. P. Long	Pennsylvania.
Victor Magliocco	Pennsylvania.
Henry Maser	Ohio.
C. H. M. Neall	Pennsylvania.
Nazario Noguera	South America.
Enrique Noguera	South America.
Harvey E. Nyer	Pennsylvania.
Juan Ph. Orozco	Central America.
Pedro A. Palacio	Cuba.
Joseph A. Phillis	Pennsylvania.
Paula Prätz	Germany.
Charlotte Renard	Germany.
Guy C. Rich	New York.
Nicolas Rocha	U.S. of Colombia.
J. Sabater Rivera	Porto Rico.
John Schembs	Pennsylvania.
Valentine Schmitt	Germany.
Courtland S. Service	Pennsylvania.
Marcus Sichel	Germany.
T. Frank Spencer	Rhode Island.
Herman Stocker	Switzerland.
José S. Tamayo	U.S. of Colombia.
Robert Addison Todd	Montana.
O. S. Watrous	Connecticut.
Charles Wetzel	West Virginia.
Frederike Wiesner	Austria.
Marvin A. Wint	Pennsylvania.
William N. Wirt	Indiana.

PHILADELPHIA DENTAL COLLEGE.

The twenty-first annual commencement of the Philadelphia Dental College was held at the American Academy of Music, Philadelphia, on Friday evening, February 29, 1884, at 8 o'clock.

The address to the graduates was delivered by S. H. Guilford, A.M., D.D.S., and the valedictory address by Edgar L. Gardiner, D.D.S.

The number of matriculates for the session was one hundred and twenty-seven.

The degree of D.D.S. was conferred on the following graduates by the president of the board of trustees:

NAME.	RESIDENCE.
Elmer B. Abbey	Connecticut.
Thomas B. Arnold	Rhode Island.
J. Tenney Barker	Connecticut.
E. Bergstresser, M.D.	Pennsylvania.
Herbert A. Birdsall	New York.
Charles A. Bills	Maine.
John Darby Blakeslee	Ohio.
John H. Boozer	South Carolina.
Edward Brettschneider	Germany.
Philip H. Carlyon	Washing'n Ter.
Francis E. Cassidy	Massachusetts.
Hayes Agnew Clement	Pennsylvania.
S. S. Costello	Maine.
Augustus R. Cooke	New York.
Norris R. Cox	Oregon.
Thomas A. Croaker	Nova Scotia.
William H. Davenport	Massachusetts.
Horace G. Darling	Vermont.
Curtis L. Erwin	Pennsylvania.
John I. Evans	New Jersey.
George H. Fluck	Nova Scotia.
Edgar L. Gardiner	Rhode Island.
Matthew S. Gooding	New York.
Milton E. Gray	New York.
J. N. Harris	Maine.
George H. Hardisty	New York.
Merton R. Harned	Illinois.
William Evart Hall	New York.
Lloyd A. King	Kentucky.
Carl Knabe	Germany.
Jesse T. Krewson	Pennsylvania.
Samuel Lightcap	Pennsylvania.
William G. Long	Illinois.
William J. Magill	Connecticut.
T. R. Medd	Minnesota.
William H. Metcalf	New York.
Frank A. Monroe	New York.
George F. Nevius	Indiana.
Charles S. Rogers	Pennsylvania.
M. A. Richards	New York.
Hans Riegner	Germany.
Frederick O. Sawyer	Maine.
Bern'd D. Schlaudecker	Pennsylvania.
Rafael S. Sevila	Mexico.
Louis N. Seymour	New York.
M. B. Smith	Pennsylvania.
William C. Stokes	New Jersey.
J. Harvey Stooksberry	Ohio.
Randolph M. Stratton	Pennsylvania.
Theodore Stanley, Jr.	Missouri.
F. Tanzer, M.D.	Austria.
W. Spencer Taylor	New York.
Edwin Ariel Thomas	Massachusetts.
James F. Thompson	Pennsylvania.
William Ray Tovell	Australia.
Ernest W. Tovell	Australia.
Alberto Vallarino	Panama.
Dan. J. Wait	Montana.
Clarendon P. Webster	N. Hampshire.
James L. Whinery	Iowa.
J. Harley Wood	New York.
William A. Woodward	Pennsylvania.
Joseph J. Worsham	Georgia.
James F. Wright	Indiana.
George H. Yates	New York.

NEW YORK COLLEGE OF DENTISTRY.

The eighteenth annual commencement of the New York College of Dentistry was held at Chickering Hall, New York City, on Thursday evening, March 6, 1884, at 7.45 o'clock.

The valedictory was delivered by George J. Neish, D.D.S., of the graduating class, and the address to the graduates by Rev. Howard Crosby, D.D., LL.D.

The number of matriculates for the session was one hundred and forty-two.

The degree of D.D.S. was conferred on the following graduates by M. McN. Walsh, Esq., president of the board of trustees:

NAME.	RESIDENCE.
John J. R. Beer	Switzerland.
Henry A. Benedict	New Jersey.
Cornelius E. Byrne	New York.
Charles L. Berger	New York.
Charles F. Burley	Conneticut.
Arthur J. Blersch	Germany.
William J. Caillé, Jr.	New York.
Luis M. Clement	Panama.
Oliver L. Cole	New York.
Edgar M. Davis	New York.
Francis Eschauzier	Spain.
Raymund Faquinetto	Cuba.
Edmond A. Ferguson	New York.
Charles B. Gates	New York.
Friedrich Grau	Germany.
Edward L. Goodell	New York.
Stephen S. Hawley	Louisiana.
Arthur C. Hull	N. Hampshire.

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Herman G. Hichborn	Maine.	Walter E. Parrott	New York.
Eugene L. Johnson	New York.	Eugenio E. Quesada	Cuba.
William R. Libbey	New York.	José B. Ross	Connecticut.
Manuel B. Lémus	U.S. Colombia.	James A. Roberts	N. Hampshire.
William Loewenthal	New Jersey.	Edward J. Ranhoffer	New York.
Roderick M. Lowe	New York.	Joseph J. Strohmeyer	New York.
Charles W. Le Beau	Ohio.	Nathan Sanders	New York.
William H. Milke	Pennsylvania.	William M. Stanbrough	New York.
Edward T. Mason	New York.	James W. Taylor	Uruguay, S.A.
George J. Neish	Canada.	Charles T. Van Derlip	New York.
Edwin F. Normand	New York.	Wesley Wait	New York.
James J. Pruden	New York.	Karl O. Wendler	Germany.

MISSOURI DENTAL COLLEGE.

THE eighteenth annual commencement exercises of the Missouri Dental College took place, in connection with those of the St. Louis Medical College, at Memorial Hall, St. Louis, Mo., on Wednesday, March 5, 1884, at 7½ o'clock P.M.

The address to the graduates was delivered by Dr. H. H. Mudd, and the valedictory by Professor G. Baumgarten, M.D.

The number of matriculates for the session was twenty-one.

The degree of D.D.S. was conferred on the following graduates by Dr. H. H. Mudd, dean:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Malcolm A. Bliss	Illinois.	George S. Henderson	Missouri.
Alfred E. Blake	California.	Warwick Winston	Missouri.
William O. Campbell	Missouri.	William R. Wickersham	Missouri.

UNIVERSITY OF TENNESSEE—DENTAL DEPARTMENT.

THE sixth annual commencement of the Dental Department of the University of Tennessee was held, in connection with that of the Medical Department, at the Masonic Theatre, Nashville, Tenn., on Tuesday, February 26, 1884.

The salutatory oration was delivered by R. S. Jamison, D.D.S.; the valedictory by Horace L. Kutchin, M.D., and the faculty charge by Professor J. G. Sinclair, M.D.

The number of matriculates for the session was thirty-two.

The degree of D.D.S. was conferred on the following graduates by Hon. J. L. Moses, president of the board of trustees of the State University:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
S. H. Baird	Alabama.	R. Scott Jamison	Mississippi
E. Beach	Tennessee.	H. R. Kline	Indiana.
J. T. Cazier	Tennessee.	M. D. Lanier	Georgia.
E. O. Dickinson	Tennessee.	C. E. McConnell	Alabama.
S. A. Hays	Tennessee.	S. G. Robinson	Alabama.
T. W. Hogan	Georgia.	J. A. Wilson	Arkansas.

VANDERBILT UNIVERSITY—DENTAL DEPARTMENT.

The fifth annual commencement of the Dental Department of Vanderbilt University was held in the chapel of the University, Nashville, Tenn., on Thursday evening, February 21, 1884.

The address on behalf of the graduating class was delivered by Benjamin G. Blackwell, D.D.S., and the faculty address by Prof. Ambrose Morrison, M.D.

The number of matriculates for the session was twenty-eight.

The degree of D.D.S was conferred on the following graduates by Chancellor Garland:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Benj'n Green Blackwell	Texas.	Olympai Felix Gambati	Georgia.
Robert B. Chapman	Alabama.	William Hamilton McCurry	Georgia.
John Edward Frazier	Alabama.	Ferris Ewing Perkins	Georgia.

INDIANA DENTAL COLLEGE.

The fifth annual commencement of the Indiana Dental College was held at Pfafflin's Music Hall, Indianapolis, Ind., March 5, 1884.

The annual address was delivered by Edward F. Hodges, M.D., and the class valedictory by Samuel A. Kiser, D.D.S.

The number of matriculates for the session was thirty-four.

The degree of D.D.S. was conferred on the following graduates by Wm. L. Heiskell, D.D.S., president of the board of trustees:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
John H. Adams	Indiana.	David C. Harold	Indiana.
Homer S. Ainsworth	Ohio.	G. Bennett Hough	Pennsylvania.
Frank C. Ayres	New York.	Merrit J. Kelley	Illinois.
Wilson M. Bayliss	Indiana.	Sanford M. Kennedy	Pennsylvania.
Jessie A. Bowman	Illinois.	Samuel A. Kiser	Ohio.
Herbert A. Chandler	Ohio.	Arkley D. Leach	Virginia.
Gerrit S. Clemens	Indiana.	Thomas H. Morgan	Indiana.
Cassius C. Curtis	Ohio.	Charles W. Myers	Indiana.
Richard Elson	Indiana.	Herbert W. Runyan	Michigan.
Ernest A. Gillet	Michigan.	Ozro W. Willis	Indiana.

UNIVERSITY OF MARYLAND—DEPARTMENT OF DENTAL SURGERY.

The second annual commencement of the Dental Department of the University of Maryland was held at the Academy of Music, Baltimore, Maryland, March 14, 1884.

The announcement of graduates was made by F. J. S. Gorgas, M.D., D.D.S., dean, and the valedictory address was delivered by Hon. J. Randolph Tucker.

The number of matriculates for the session was eighty-six. The degree of D.D.S. was conferred on the following graduates by Hon. S. Teackle Wallis, LL.D., provost of the University:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Theodore W. Albright	New York.	R. Dallas Kibler	Virginia.
James B. Bigham	South Carolina.	Wiley S. Killingsworth	South Carolina.
Chas B. Blubaugh, M.D.	W. Virginia.	Chas. J. Ladson	Dist. of Col.
Wilbur C. Bressler	Pennsylvania.	Clarence E. Lemley	Virginia.
Henry H. Boswell	Maryland.	William Edward Lewis	Florida.
John H. Brown	Ohio.	Job B. Mallott	Pennsylvania.
George Buttler, Jr.	New Jersey.	Charles H. McDowell	North Carolina.
John M. Comegys	Tennessee.	Semoney J. Minghin	West Virginia.
George V. Copp	Virginia.	S. Latimer Phillips	Virginia.
Almond J. Cutting	Massachusetts.	George Edward Purnell	Maryland.
Isaac H. Davis	Maryland.	Nelson T. Shields	Texas.
Watson E. Dorchester	New York.	A. La Fayette Stratford	North Carolina.
Richard D. Evans	S. Wales, G. B.	Reading B. Swindel	North Carolina.
Claus Henry Fitler	Germany.	John E. Taggart	Vermont.
Nathan E. Foote	New York.	Robert R. Vaughan	Missouri.
Frank C. Gallup	Connecticut.	Richard van der Hoppe	Austria.
James Edwin Harris	Maryland.	Joseph T. Wayman	Virginia.
S. Dwight Hodge	Vermont.	Elmer J. Wisherd	Maryland.

UNIVERSITY OF IOWA—DENTAL DEPARTMENT.

The second annual commencement of the Dental Department of the State University of Iowa was held in the Opera House, Iowa City, Iowa, on Wednesday, March 5, 1884, at 2.30 P.M.

The faculty valedictory was delivered by L. C. Ingersoll, A.M., D.D.S., dean, and the class valedictory by W. K. Sinton, D.D.S.

The number of matriculates for the session was thirty-one.

The degree of D.D.S. was conferred on the following graduates by the Governor, Buren R. Sherman:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
J. O. Ball	Iowa.	F. R. Ross	Iowa.
J. H. Besore	Iowa.	M. H. Ross	Iowa.
F. C. Chamberlain	Iowa.	W. K. Sinton	Iowa.
Rufus Elmer	New Jersey.	J. W. Stark	Illinois.
T. M. Hallet	Iowa.	R. H. Tullis	Ohio.
S. G. Hill	Iowa.	W. H. Walker	Iowa.
S. W. Hill	Iowa.		

KANSAS CITY DENTAL COLLEGE.

The annual commencement exercises of the Kansas City Dental College were held at Coates Opera House, Kansas City, Mo., on Tuesday, March 4, 1884.

The annual address was delivered by J. H. Van Eman, M.D.

The number of matriculates for the session was nine.

The degree of D.D.S. was conferred on one graduate, J. W. Peck, M.D., by F. M. Johnson, M.D.

TO THE FACULTIES OF THE DENTAL COLLEGES OF THE UNITED STATES.

At an informal conference of the Deans of the Pennsylvania College of Dental Surgery, the Philadelphia Dental College, the Dental Department of the University of Pennsylvania, and the Baltimore College of Dental Surgery, it was decided to invite a meeting of the Faculties (or their representatives) of all the Dental Colleges in the United States, at the Sturtevant House, New York City, on Monday, August 4, 1884, for the purpose of adopting a uniform standard of graduation, etc. (Signed,)

R. B. Winder, J. E. Garretson,
James Truman, C. N. Peirce.

BIBLIOGRAPHICAL.

A System of Oral Surgery: Being a Treatise on the Diseases and Surgery of the Mouth, Jaws, Face, Teeth, and Associate Parts. By James E. Garretson, M.D., D.D.S. Illustrated with numerous Steel Plates and Wood-cuts. Fourth edition, thoroughly Revised, with Additions; pp. 1037. Philadelphia: J. B. Lippincott & Co., 1884. Price, cloth, $8.00; sheep, $9.00.

The three previous editions of this work have been noticed, as they appeared, in these pages. This edition is enlarged by the addition of several chapters on subjects not heretofore embraced. Seventy-five new illustrations have been introduced, and every part of the volume has been rearranged or rewritten, condensed and simplified in certain portions, and much new matter has been added.

The scope of the volume is indicated in the title,—a consideration of the diseases and surgery of the mouth, jaws, face, teeth, and associate parts. It would be indeed a rare pathological condition of the parts named which does not find discussion in this work. The first four hundred and seventy-five pages are devoted to the treatment of topics which beyond question concern the every-day practice of dentistry, while much of the remaining portion of the book treats of subjects with which every dentist should certainly be familiar, such as palatine defects and their treatment, the antrum of Highmore and its diseases, salivary fistulæ, caries, necrosis, dislocations and fractures of the maxillæ, anchylosis of the jaw, neuralgia, the epulides, exostoses, cystic tumors, anæsthesia, and inflammation.

Assuming that the average dentist is not ambitious to acquire a practical knowledge of the diseases and surgery of the "associate parts," there is yet much in other chapters which deserves his study,—as, for instance, under the heading, "Diseases of the Floor of the Mouth," there is to be found, besides the anatomy of the part, a description of ranula, its varieties and treatment; encysted calculi, etc. And if the practitioner of twenty years is not interested in a study of the aphthæ, the tongue, the tonsil glands, the uvula, and the pharynx, surely the student in dentistry of to-day must recognize a shortcoming if he fail to be informed thereupon. If, proceeding thus far, he be not inclined to learn what are the recognized procedures proper in wounds of the mouth; to understand if he do not practice operations upon the lips and cheek; to be familiar with the vascular system of the external and deep facial regions, with the treatment of nerve lesions, and with the classification of tumors, it is because he has accepted narrow boundaries; and the few remaining chapters, which treat of diseases of the face, nose, neck, etc., will not be likely to interest him. Notwithstanding the criticism upon the wisdom of grouping these topics in a treatise of this character, there is manifest propriety in such grouping. Just where the special practice of the medically educated dentist shall begin, what it shall include, and where it will find its limitations, will depend, as in the practice of every other specialty, on the inclination and capabilities of the practitioner. But if the student of to-day is willing that his professional sphere shall find its limitations inside the lines which bounded his predecessors, he has not comprehended the meaning of the doctorate which is the object of his ambition.

That there has been a hiatus—a debatable ground—between general medicine and surgery and dentistry, is a fact to which attention has frequently been called in these pages. Many chapters in Dr. Garretson's book illustrate this forcibly, and demonstrate the necessity not only for a broader culture of the dental specialist, but as well the need for a better appreciation, on the part of the general surgeon and physician, of the systemic relations of oral lesions. In the ranks of dentistry are men whose ambition is not limited to the filling, extraction, and replacement of teeth; and when dentistry is recognized, as it surely will be, as a specialty of medicine, those who have learned, by study, experience, and proficiency, the medical, surgical, artistic, and mechanical aspects of their profession will find the recognition to which they will be entitled.

In a volume of this size, and treating of so many topics, it would be idle to expect that there would not be much open to criticism. The author holds views which are earnestly combated by other distinguished gentlemen, but has also a large following in these respects. It would be manifestly impossible, considering the discordant views in reference to almost every detail of the work of the office, that a book of this kind could be written which should meet the approval of all. Where so much is good, however, we are willing to leave criticism on minor points to others, satisfied that

Dr. Garretson's "System of Oral Surgery" is in the main eminently practical, and, as an encyclopedic presentation of the higher as well as of the ordinary aspects of dentistry, has no rival.

ILLUSTRATIONS OF THE INFLUENCE OF THE MIND UPON THE BODY IN HEALTH AND DISEASE, designed to Elucidate the Action of the Imagination. By DANIEL HACK TUKE, M.D., F.R.C.P., LL.D. Second American from the second English edition. 482 pages. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $3.00.

The author of this volume, taking as his text the saying of John Hunter, "There is not a natural action in the body, whether involuntary or voluntary, that may not be influenced by the peculiar state of the mind at the time," has formulated the generally accepted facts of physiology and psychology as they bear on the question of the influence of the mind upon the body. He has collected into one volume, from all sources at his command, authenticated facts illustrative of this influence, and supplemented them by instances which have come under his own observation. He has given fresh interest and value even to familiar records, by arranging them on a definite physiological basis, in the effort to explain the mode by and the channel through which this influence is exerted, not only in health, in causing disorders of sensation, motion, and the organic functions, but showing its importance as a practical remedy in disease.

There is no doubt that there are wider laws and a larger circle of phenomena than have been generally apprehended, and a dogmatic incredulity as to all asserted or apparent facts at variance with ordinary experience is more likely to betoken ignorance than knowledge. It is as unphilosophical to deny alleged facts simply because they are opposed to ordinary experience or to preconceived opinions, as it is to accept without investigation and vigorous tests an explanation of such phenomena which assumes the intervention of supernatural power. It is certainly very desirable, as the author claims, to ascertain what is "the range of the phenomena which can be fairly explained by well-recognized psycho-physical principles."

The volume is a valuable addition to the literature of its subject, and deserves the study of physicians who would avail themselves of mental influences in so far as they can be applied and guided with wisdom and skill in the alleviation or cure of disease. It may also be read with profit by those who are interested in the manifestations of modern spiritualism. The author, indeed, regards the book as a not unfitting introduction to the study of the alleged facts bearing on the so-called spiritualistic phenomena. Apart from its special value to the two classes named, the work contains much of interest to any intelligent person. Its topics are so methodically arranged and philosophically considered, that it should find a large circle of readers.

The fine paper and excellent typography make this an exceptionally pleasant volume for perusal.

NOTES ON DENTAL PRACTICE. By HENRY C. QUINBY, Licentiate in Dental Surgery of the Royal College of Surgeons in Ireland, and member of the Odontological Societies of New York and London. With Illustrations. Philadelphia: The S. S. White Dental Manufacturing Co., 1884. Price, cloth, $2.25.

This is a work covering nearly two hundred pages, and divided into eight compact chapters, as follows: "The Temporary Teeth," "The Permanent Teeth," "Extraction as a Means of Preventing Decay," "Irregularities," "Treatment of Adult Teeth," "Amalgam," "Pivoting," "Gutta-percha Impressions."

The author, as stated in his preface, has not attempted "to wade in the deep waters of physiological and pathological research;" but has simply given a clear and succinct exposition of his methods in every-day practice. Not often in the history of dental literature has work of that kind been so well done as in the present instance. Dr. Quinby's literary style is singularly perspicuous; an obscure passage is hardly to be found in the book, and his lucid text is amply illustrated by drawings clear in design and excellent in execution.

Turning to the weightier matters of doctrine and practice of which the volume is an exposition, we first note with regret that the author's long residence in England has so indoctrinated him with English ideas that, in the three or four pages he devotes to anesthesia, he has given his indorsement to the use of chloroform in dental operations, and this, too, without any hint as to the special danger of heart paralysis, which, owing to the close association of the nucleus of the fifth nerve with the pneumogastric, is now known to attend dental operations under the influence of that agent.

It is true that Dr. Quinby advises the dentist to avoid responsibility; that, "if it is decided to make use of an anesthetic, the assistance of a surgeon should be considered indispensable,"—a teaching sound enough if the dentist has not properly qualified himself for his work by a careful study of the physiological effects of anesthetics in general, and of the methods for their safe administration; but with such training there can be no reason why the dentist should not be as well fitted to give anesthetics as the surgeon, or the callow assistant to whom the administration of the anesthetic is so often intrusted by him. Is it not about time that dentistry ceased to be tied to the apron-strings of the mother profession?

The co-operation of the surgeon does not by any means clear the dentist from opprobrium in the case of misadventure, and it certainly does not insure safety when chloroform is the agent employed, as at least two cases occurring in this country during the past few months demonstrate. In one case the surgeon's wife was the victim, and in both cases the dentist's name was telegraphed over the country, the name of the surgeon being in one instance suppressed.

Prof. Lyman, of Rush Medical College, in his excellent work on anesthesia, has a passage very significant in this relation. He says:

> "A perusal of the history of these cases" (in mortality tables) "is sufficient to produce the conviction that comparatively few of the cases of death from chloroform have been acknowledged and published. The vast majority of the cases thus far reported have occurred in the hospitals of Great Britain. A death from the use of chloroform in private practice is seldom announced, unless it may chance to have happened in the office of an unlucky dentist. Then, of course, there is great publicity, and the event is carefully chronicled. Occasionally some elderly physician alludes in a cautious manner to a case of which he was cognizant, long years ago, in a remote quarter of the earth. In some such way it has been published (*The Clinic*, page 150, March 31, 1877) that in Cincinnati and its adjacent territory not less than twenty-five deaths from chloroform have occurred since the introduction of that agent."

Dr. Quinby does not favor the administration, by the dental practitioner, even of nitrous oxide gas, but states that, "used as it is in some of the larger towns in the United States" (by specialists) "nothing can be better." To those who know what hecatombs of slaughtered teeth are annually offered up before this Moloch of specialism, there is a grim humor in the commendation.

Extraction as a specialty has, of course, its conveniences, and some of those who follow it often advise against the wanton sacrifice of teeth; but under a system so vicious—a system in which not conservation but extirpation is the ultimate aim—the best of them cannot fail to commit daily what, from a physiological stand-point, is the grossest malpractice; almost entire sets of fairly good teeth being sacrificed at the behest of crass ignorance or egregious vanity. It would be interesting to learn how far the assent, or even entreaty, of the victim of such practice would clear the operator in a subsequent suit for damages. Morally, he is certainly responsible.

The fact is that the system as at present carried on is, in all its features, the opprobrium of dentistry, and its present proportions are directly due to that shirking of trouble and avoidance of responsibility which the author advises.

This is the only serious blemish in Dr. Quinby's book. Upon many controverted points he has decided views, and those who do not accept his conclusions must admit that he states his reasons with force and yet with fairness and moderation. He favors the extraction of the sixth-year molars, and advises devitalization of exposed pulps in deciduous molars, without subsequent stopping, the crowns being allowed to crumble away,—he claiming that devitalization, to a great extent, arrests the absorption of deciduous roots, and that the crowns being disintegrated by decay, the roots will be isolated, and the permanent tooth thus more readily force its way up between them without distortion from its own true line of direction.

The author is an advocate for plastic stoppings up to the sixteenth year or beyond. He favors soft foil and hand-pressure, and condemns wedging and the mallet.

It would be a pleasure, did space permit, to quote some of the more noteworthy passages in this volume. Especially admirable are the remarks upon the duties of parents and of the dentist in relation to the teeth of young children. Could his advice but be read and heeded by those interested, this, the most trying and unsatisfactory part of dental practice, would cease to be formidable.

Many other passages, too, are illuminated with the same ruling common sense, and, however much he may differ from the author in detail, the candid reader cannot fail to be convinced that he stands in the right attitude towards his patients and his profession; that he does not see in dentistry simply an opportunity for packing in carious teeth the largest possible amount of gold in the smallest possible amount of time, but that he brings to his task enlightened humanity, wise conservatism, judicial fairness, and educated skill.

W. F. L.

VULCANITE AND CELLULOID: Instructions in their Practical Working for Dental Purposes. By S. ELDRED GILBERT, D.D.S., Instructor of Clinical Dentistry in the Philadelphia Dental College. With Illustrations. 116 pages. Philadelphia: The S. S. White Dental Manufacturing Co. Price, cloth, 75 cents.

The character of this little work is fully described in its title. It is a concise monograph which will be of great assistance to the student, as it gives in a terse manner full instructions for the manipulation of these important materials in the production of artificial dentures. The directions for each step, from taking the impression to the finished denture, relate to practical working methods, plainly stated, which if carefully followed must lead to successful results.

The chief value of the book lies in the presentation of a few processes which are reliable, rather than a multiplicity of methods from which a student must choose before his judgment in such matters is sufficiently mature to make a judicious selection.

The method given for taking impressions in plaster for difficult partial lower dentures is not as accurate, nor, in fact, as easy of performance, as the one described and recommended by Prof. Essig in such cases. (See Dental Cosmos for March, 1875, page 144.)

The author omits the direction to oil the cup whenever it is desired to separate it in the mouth from the impression in order to remove the latter in fragments. The directions for vulcanizing would have been better had the author not advised filling the vulcanizer two-thirds full of water, thus completely immersing the flask. Far better results in the quality and color of the plate are obtained by using a small quantity of water and vulcanizing in the steam space above it, this fact being fully brought out in the directions for vulcanizing in the New-Mode Heater.

The book is full of useful information, particularly well adapted for the use of students, for whom it is especially designed.

E. C. K.

Pamphlets Received.

A Memorial Meeting Relative to the Death of Prof. Thomas L. Buckingham, under the auspices of the Dental Societies of Philadelphia, held at 8 o'clock P.M., October 30, 1883, in the hall of the Pennsylvania College of Dental Surgery, Philadelphia. With a Portrait. Philadelphia: Press of Patterson & White, 1884.

Transactions of the American Ophthalmological Society. Nineteenth Annual Meeting, Catskill Mountains, 1883. New York: Published by the Society.

Transactions of the Ohio State Dental Society, at its Eighteenth Annual Meeting, held in Columbus, October 31 and November 1 and 2, 1883. Columbus, Ohio: Published by the Society.

Transactions of the Illinois State Dental Society, Nineteenth Annual Meeting, held at Decatur, Ill., May 8, 1883. Toledo, Ohio: Press of the "Ohio State Journal of Dental Science."

HINTS AND QUERIES.

To the Editor of the Dental Cosmos:

I notice a grave error in the report of the "Section on Literature and Nomenclature" of the American Dental Association, published in your journal for March. Your criticisms are seasonable and just. But one fact seems to have been overlooked. In the report of the Section, "Periosteum," the use of the word "periodontium," in place of periosteum, is disapproved, no valid reason being seen for such change. This tissue, the report continues, "of course surrounds the dentine, but is not in contact with it, the cement or dentos intervening," etc. Evidently the writer of the report misunderstands the derivation of the word "periodontium," and what is meant to be taught by it. "Periodontium" is derived from two Greek words, *peri*, around or about, and *odous*, a tooth (the genitive form of the word being used here), and has no reference to the *dentine* of the tooth, but to the *tooth* itself. "Periodontium" means, then, "about or around *the tooth*," and *not dentine*, as the writer implies, just as "periosteum," coming from two other Greek words, means "about the bone," and consequently, "if the desire is to be very definite and indicate that this structure is about the teeth," "periodontium" is the most precise and concise word that could be employed to convey the meaning that is intended. The work of revising our rather loosely constructed nomenclature, it strikes me, should be put into hands more skilled in criticism, and who would not make such unpardonable mistakes.—W. C. W.

Dental Legislation.—Law is for the protection of the law-abiding, and legislators are elected by the people to make laws for their protection. The entrance to the practice of dentistry is being somewhat hindered by laws demanding proof of qualification. In the first place, such laws are eminently just and right, being a protection, not only to those who have been to the expense of time, money, and labor to qualify themselves for practice, but also to the public, who are to a great extent incapable of correct discrimination.

A second reason why dental legislation should obtain generally is that its influence is to advance the standard of excellence in dental practice. If the only gateways by which to enter the practice of dentistry be reputable dental colleges, or a strict examination before a board of dental examiners, those who know that they cannot pass the required examination are deterred from attempting it. Thus we may hope for a better educated class of dentists. Moreover, fewer will enter the profession, and this will tend to advance the standard of excellence. As fees for services are usually, we might almost say always, reduced by competition so also the value of services is usually lowered by the reduction of fees. This lowering of fees is not alone due to competition, for a knowledge which is easily or cheaply obtained is generally lightly valued by its possessor, and in proportion as an entrance to the practice of dentistry is made difficult the charges will be advanced, and in proportion to the charges will be the excellence of the work. Anything which will tend to increase the excellence of work will redound to the benefit of the profession and the public.

A third reason why dental legislation should be general is that, if some States are protected from unqualified practitioners and others are not, those left unprotected are almost certain to be overrun by unqualified persons prohibited from practicing in the protected States. As the States now having dental laws are many and rapidly increasing, it behooves those still unprotected to realize this fact; and if legislation should be delayed in them for a decade or two they may expect to become the cities of refuge for quacks and incompetents. If with the passing of a dental act in each State the supply of recruits to the dental ranks would cease or be reduced, there would be no great cause of fear; but a reduction can be brought about only by legislation obtaining in all the States. An office boy is often a necessary evil, and it is not to be expected of a boy that after having spent years in a dental office he will be willing to learn a trade. Boys will learn; no system of ethics will keep their ears and eyes closed. The office boy being probably the son of poor parents, who obliged him early in life to earn his living, he is not apt to value a dental college education very highly, but to consider himself competent to "Go West" and start an office of his own. But there is another source of supply of raw recruits which will not be checked except by general legislation throughout the States, and this is the apprenticeship system. It would seem at first glance that there would be a large falling off in the number of candidates for apprenticeship in States having dental laws, but on closer examination we shall see that the opposite result is more probable. The inducements to dentists practicing in such States to take apprentices are largely increased by the fact that they no longer fear that their apprentices will become their rivals and carry away some of their patients; and thus the fees they may receive for a few months' tuition are clear gain. They may even seek for apprentices, representing to them the advantages of residing in States untrammelled by dental legislation. A great many young men would rather not stay near home to commence the practice of a profession, but go where they are not so well known.

Here are three reasons why the practice of dentistry should be regulated by legislation throughout the Union. First, as an act of justice to humanity; second, because all new-comers to our ranks would then be compelled to qualify themselves, and thus the character and reputation of the dental profession would be raised; third, if limited to certain States, the remainder must suffer from that by which the others are benefited.

Objections against legislation are raised even by members of the dental profession. It is said, "This is a free country; we have no right to prevent any man from going where he chooses for dental operations." "Give the boys a chance! Let them come in and make a living if they can." This sounds magnanimous, but is fallacious, as the law gives the boys a chance—to qualify themselves. But the worst of all reasons urged against dental legislation is that the more incompetent dentists there are in practice the more work is made for the qualified. Of course every one thinks himself qualified. This argument is open only to anathema.

But hindrances to dental legislation may come from those who are actually in favor of it, in petty differences of opinion which ought not to prevent unanimity of action. The opportunity to elevate the profession is permitted to go unheeded because of trifling disagreements, and thus dentistry is wounded in the house of its friends.—STEWART J. SPENCE, *San Francisco, Cal.*

TO THE EDITOR OF THE DENTAL COSMOS:

Lest a former communication of mine, in regard to the use of dental diplomas in German practice, may mislead some of your readers, I beg leave to re-state some facts which here exist. One can practice dentistry in Germany without a diploma, but with or without one he is restricted in the use of a title (or may be) in consequence of a technical clause still existing in the laws.

A German dental student, to be fully equipped, must present himself before a medical commission and be examined and "approbated" (as they call it) to practice dentistry. Then follows a clause after this law empowering the commission to approbate as zahnarzt to this effect: "If any person shall call himself a zahnarzt (which means dentist) who has not been thus approbated, he is liable to fine and punishment," etc.

One can readily see that there has been no intention of restricting qualified practice here by this, and you are permitted to register your name before a magistrate as a dentist and practice at once, and be taxed as a man doing business. But how inconsistent this is. Their magistrates call you a dentist, their tax-gathering officials tax you as such, and if you call yourself an American dentist—which seems equivalent to saying you are not a German zahnarzt—you can be fined because you have not been approbated in this country, for stating this truth, by this very law, which was only enacted for the punishment of those who wished to deceive the public by lying. This is the only law of restriction here, and it is somewhat comparable to a legal scythe which cuts down the innocent as well as the guilty when put in use.

The remedy for this state of things is found, by the German *un*-approbated, by using in their own language some term signifying zahnarzt without using that title; and the American may find his title of dentist a rose as sweet by some other name—especially when some approbated German thinks him too well qualified for a competitor, and so makes complaint to the police to have him fined. But Americans with proper diplomas can call themselves doctors, or doctors of dental surgery. Of course in many parts of the country this little technicality is a perfect dead letter, and foreigners are entirely unmolested in the use of their titles.—H. F. Bishop, D.D.S., *Hanover*, *Germany*.

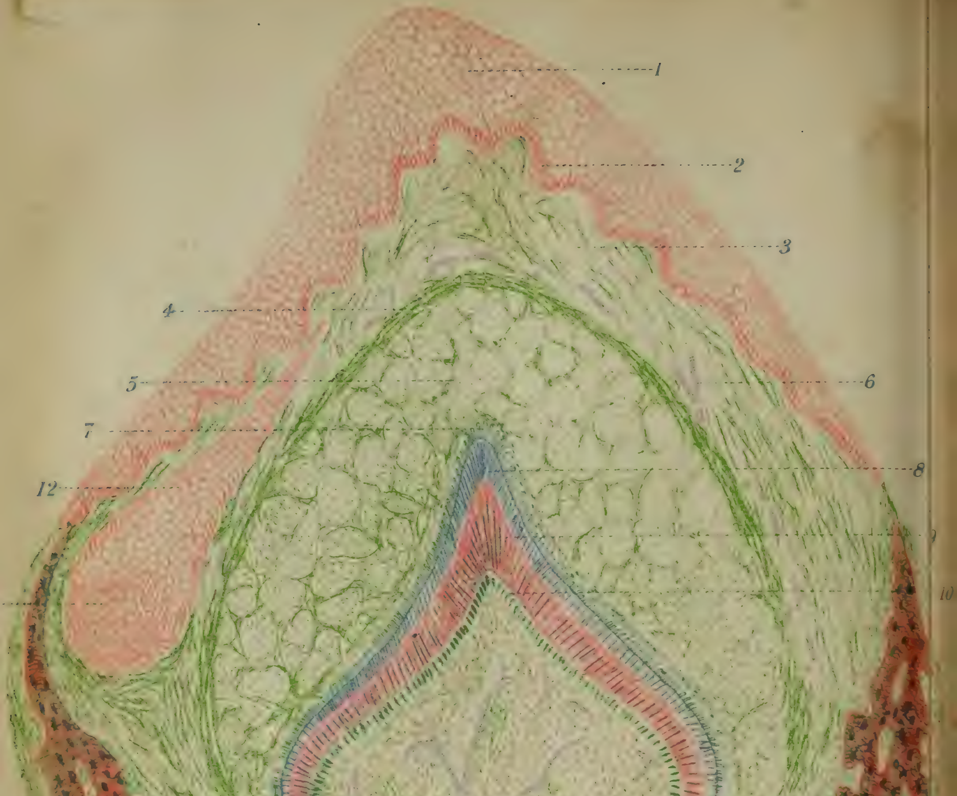
To the Editor of the Dental Cosmos:

In reading Dr. J. N. Farrar's article, in the February number of the Dental Cosmos, on the "Radical and Heroic Treatment of Alveolar Abscess," I was reminded of an operation of the same nature I performed for one of my patients several years ago, in Chicago. A gentleman came to me having a badly decayed right lower second molar, with abscess, which I treated, and in due time filled. After the lapse of about six months, he came back on account of the tooth causing some trouble, and on examination, I found the gum soft and spongy, with considerable inflammation, and on pressure a little matter would exude from around the anterior root. As he did not want to have the tooth extracted, if it could possibly be saved, I decided to amputate the anterior root, which I did; then syringed out the socket and treated with Phénol Sodique. It being the second molar, and the first molar being a good one, it naturally braced the one from which I took the root, and enabled it to do its share of grinding without being pushed out of its natural position, and when last seen was in a healthy condition and doing well. —Geo. P. Mann.

Two Little Hints.—To extract badly broken-down roots of teeth, decayed below the edge of the alveolus, such as would indicate the use of the screw, to prevent crushing under the pressure of the forceps or elevator, I hit upon a happy little method about twenty years ago which I have used ever since. It is a perfect success. Clear out the cavity in the root as for filling, securing good retaining points; then fill with the hardest-setting amalgam, and allow it to thoroughly harden. It is then effectually braced alike in all its parts, and there is no danger of crushing it by the use of any implement selected for extraction.

When out of reach of a stock of artificial teeth, if a single tooth of a certain kind is needed, and you have no single tooth to suit, but have one as part of a section, a diamond disk on the hand-piece of a dental engine will cut out the one wanted. It does it quickly and nicely.—B. F. H.

Porosity of Vulcanite.—In your January issue, page 62, P. R. W. writes: "The advantage of a rubber heavily loaded with foreign substances is that it has comparatively little shrinkage, but this is offset by porosity and brittleness." With reference to *porosity* I think the gentleman's statement imperfect. That the purer rubbers are *most* subject to sponginess can be readily demonstrated by vulcanizing various rubbers at one heating, in equal-sized blocks, of say half an inch cubic. On sawing open these blocks, it will be seen that the purest one of the rubbers (black) is the most spongy, and that most heavily loaded with foreign substances (weighted rubber) the least spongy; while between these extremes the others will be found spongy in about the proportion of their purity and darkness.—Stewart J. Spence.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THE

DENTAL COSMOS.

Vol. XXVI. PHILADELPHIA, MAY, 1884. No. 5.

ORIGINAL COMMUNICATIONS.

EMBRYOLOGY: WITH SPECIAL REFERENCE TO THE DEVELOPMENT OF THE TEETH AND CONTIGUOUS PARTS.

BY J. L. WILLIAMS, NEW HAVEN, CONN.

[Read before the New England Dental Society, at Providence, R. I., Oct. 4, 1883.]

(Continued from page 200.)

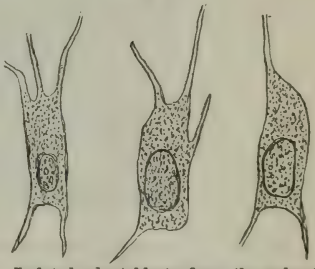
It will be seen, by referring to Figs. 17 and 18, that the so-called "stellate cells," which have formerly been supposed to constitute the entire internal structure of the enamel organ, and to be the result of a progressive atrophy of the epithelial cells of which it is composed, are in reality a mesh-work or reticulum, holding either large corpuscular elements, or, what amounts to the same thing, a granular protoplasm. The entire protoplasmic contents of the reticulum of the enamel organ are heavily impregnated with lime-salts, which are conveyed from the capillary vessels surrounding the tooth-sac to the ameloblasts for the formation of the enamel. Concerning the exact *modus operandi* of the formation of the enamel, as well as other hard tissues in which we have a basis-substance with calcific infiltration, we have yet much to learn.

If it is true, as taught by Prof. Heitzmann, that the building up of enamel proceeds by the successive formation of layers of ameloblasts or enamel-forming cells, which are changed into a glue-yielding basis-substance which becomes the seat of calcific infiltration, then it is strange that we are never able to discover but a single layer of cells. If there were successive layers formed, as there must be if the cell substance itself becomes the seat of calcific infiltration, why are we not able to discover these successive layers of cells in process of formation? So far as appearances teach us anything, it seems as though the ameloblasts were the active agents in depositing the lime-salts on the periphery of the dentine, and that they gradually recede with the progressive formation of the enamel. When enamel-cells are torn from partly-formed enamel, they show a fiber running out from that end of the cell lying next to the enamel. Transverse sections of newly-formed enamel show this fiber *in the center of the prism.* This would seem to show that the fiber might be a prolongation of the nucleus of the cell, which grows and remains as a permanent fiber as the cell recedes. If this be true, the delicate reticulum observed and described by Dr. Bödecker may be an outgrowth from this persistent fiber. My discoveries concerning the structure of the odontoblast and the origin of the dentinal fiber, to which I shall presently refer, would seem to confirm this view. I am not unmindful of the investigations of Prof. Frank Abbott on caries of the teeth, in which he describes the breaking down of enamel into medullary corpuscles. But if I were to grant the existence of such products of inflammatory metamorphosis of the enamel, which I am not quite prepared to do, it would not follow that these corpuscles are evidence of the manner in which the enamel is built up or formed; for inflammatory corpuscles may be developed in any tissue from the bioplasson or living matter which it contains. But, whether the formation of enamel results from calcific infiltration of the ameloblasts, or is effected by a process of secretion and deposition, the enamel prisms undoubtedly receive their form from the peculiar arrangement of the ameloblasts; for we find that the structure of the outer portion of enamel on a completely developed tooth corresponds with the arrangement of the flat layer of cells just outside of the ameloblasts as seen in the developing tooth.

My studies of pulp-tissue have led to the discovery that the odontoblasts are probably of the nature of multipolar ganglion cells. More than two years ago I became convinced that the dentinal fibrillæ were prolongations of cells lying at or near the periphery of the pulp. But this view was confirmed only by an occasional glimpse of an isolated cell from which could be seen projecting a small portion of a broken fiber. Only those who have had practical experience in the preparation of sections of tissues for mounting for microscopic study can judge of the difficulties in cutting sections of hard and soft tissues in juxtaposition without disturbing the relation of the parts. The extremely delicate fibrillæ are almost sure to be torn from their connection with the odontoblasts, and then they present the appearance of cells with their outermost ends set squarely against the dentine. The specimens from which I succeeded in demonstrating the true nature and structure of the odontoblasts were prepared in the following manner: The tissues were partially decalcified in a very weak solution of chromic acid. A small piece was then placed in water and allowed to remain for a few hours, for the purpose of removing as much as possible of the chromic acid.

From this the material was transferred to a mucilage of gum-arabic in water, where it was allowed to remain an hour. It was then placed in the section-cutter, which was surrounded by an ice and salt mixture, and left undisturbed until the material was solidly frozen. Exceedingly thin sections were then cut, the frozen condition permitting the knife to pass through hard and soft tissues without disturbing their relation. The thin sections which rolled up on the knife were immediately transferred, by means of a small camel's-hair brush, to the slides, and placed in the position where they were to be mounted. As the sections thawed they unrolled and assumed a position from which they were not moved, all of the staining and treatment for mounting being effected with each specimen on its own slide. I thus succeeded in obtaining a few specimens so thin that but a single layer of odontoblasts is shown, and with all of the tissues in their natural relations. The dentinal fibrillæ were seen to be prolongations of the odontoblasts. From some of the cells but a single fiber could be traced, while from others two and sometimes three fibers were seen to originate (Fig. 19). Not only could I trace the darker line surrounding the cell or the cell-wall along the side of the fibrillæ, but the lighter-colored protoplasmic contents of the cell were also seen to be continuous with the center of the fibers. Delicate fibers are also seen to project from the ends of the cells lying next to the pulp-tissue. These fibers are in direct connection with the reticulum of the pulp—an exceedingly delicate structure, which holds large medullary corpuscles, and is nucleated at its points of intersection. Nerve fibers are seen to ramify everywhere near the surface of the pulp, and under high power* can be seen to *send termial fibrillæ into the reticulum, with which the roots of the odontoblasts are in immediate connection.* (Fig. 20.)

FIG. 19.



Isolated odontoblasts, from the pulp of tooth of kitten four weeks old.

Since the announcement of my discovery of the ganglionic nature of the cells lying on the periphery of the pulp, I have frequently been asked how I explain the formation of dentine. Do these cells perform a double use? Are they elements of sensation and secretion at the same time? It would seem to be almost a self-evident conclusion that the material for maintaining the continued integrity of the dentine must be provided by these cells, for the living matter (the fibrillæ) which fills the canaliculi is a prolongation of these cells, as we have seen. If the supply of nutritive material for maintaining the continued integrity of the dentine comes from this source, it would seem that we might logically infer that it was originally formed in this way. Our previous study of the physiological significance of the primary germinal tissues again finds practical application here. We have seen that in many of the low forms of life, the tissues of which are represented in higher forms of life while in an embryonal condition, where differentiation has made little progress, a multiplicity of function is performed by the same elements or cells. Now, the researches of Drs. Heitzmann and Bödecker have shown the pulp to be a remnant of embryonal tissue, or a form of embryonal tissue which persists in the development of the organism. We should therefore expect to find pulp-tissue performing a multiplicity of function—a deduction which seems in every way to be strengthened by all the facts in our possession. The odontoblasts, while composed of what is essentially neural matter, are probably at the same time the active elementary agents

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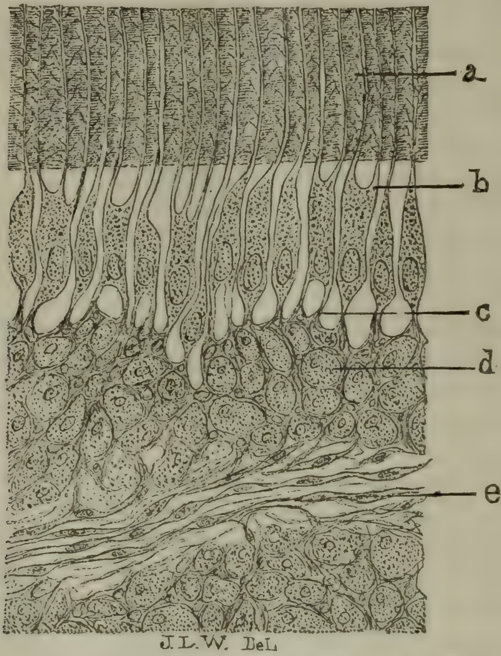
* The discovery of the ganglionic nature of the odontoblasts was made by the aid of a $\frac{1}{25}$ homogeneous immersion objective, made by H. R. Spencer & Co., of Geneva, N. Y. Its power of resolution is said, by good authority, to be superior to anything heretofore produced.

Fig. 20.



a, Dentine; *b*, odontoblasts, showing origin of dentinal fibrillæ; *c*, showing connection of odontoblasts with reticulum of pulp; *d*, large corpuscles held in reticulum; *e*, nerve-fibers.

in secreting the material for the formation and continued integrity of the dentine.

Having brought to your notice some of the salient points in the development of the teeth, let us review the process and observe the connection of these points as illustrated by the chromo-lithograph which accompanies this paper. The embryonal jaw is covered by several layers of epithelial cells. By a proliferation and increase in size of these cells, an epithelial band or *bourrelet* is produced, which traverses the surface of the jaw. From the inside of this band an epithelial lamina is developed, from the edge of which arise the epithelial cords, which sink into the dermal tissue of the jaw. The end of this epithelial cord enlarges and becomes invaginated to form the enamel organ, beneath which the dentine germ arises. It is thus seen that the teeth are not developed either in an open or a closed groove, but at the end of an epithelial cord, which arises from the columnar layer of epithelium. A connective-tissue sac is developed from the embryonal corpuscles of the dermal tissue, which surrounds the developing tooth. The dentine is the first of the hard tissues of the tooth to make its appearance, and is first seen at the tip of the developing tooth, or at those points which correspond with the future cusps or cutting edges. Shortly after the formation of enamel begins on the surface of the dentine. The enamel is formed from the enamel organ, or, more properly speaking, the enamel pulp. Its formation proceeds from the surface of the dentine outwards. The active elementary agents in the formation of enamel are the ameloblasts. It is probably formed, not by a change of these cells into a glue-yielding basis-substance which becomes infiltrated with lime-salts, but by a process of secretion and deposition. As the formation of the enamel progresses these cells recede, and leave what appears to be a fiber of living matter in the center of the enamel prism. In transverse section of newly-formed enamel this fiber is seen as a round dot, presenting an appearance closely resembling the dentinal fiber.

The ameloblasts finally become almost obliterated, and, together with the outer layer of small flat cells which lie directly upon the ameloblasts, are probably calcified to form "Nasmyth's membrane."

The formation of dentine begins upon the surface of the embryonal pulp, and proceeds inwards until the law of typal requirement is fulfilled. The germ of the permanent tooth may often be seen in the same section which shows the temporary tooth in an advanced stage of development. It is usually developed from a bud or projection from the cord of the temporary tooth. It gradually drops down beside the developing temporary tooth, and as this rises and finally emerges from the surface of the jaw, the germ of the permanent tooth passes nearly beneath it, and undergoes the same process of development, which, however, is extended over a much greater length of time. The formation of cementum, the development of the surrounding osseous tissue, and the process of absorption of the roots of the temporary teeth will be the subjects of the next paper, which will conclude the present series.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

The New York Odontological Society held a regular meeting at the house of Dr. W. E. Hoag, No. 13 East Forty-third Street, New York, February 19, 1884, the president, Dr. William Jarvie, Jr., in the chair.

Incidents of Office Practice.

Dr. N. W. Kingsley. I have a very commonplace incident of office practice that I may relate. In these days of the advanced and scientific state of modern dentistry it is about as much as a man's reputation is worth to refer to mechanical dentistry. I think those who have listened to the discussions upon the subject of dental education in the various State and national associations, and have read the immense amount of nonsense that has been written on that subject, must have become disgusted if they have ever had any interest or any pride in artificial dentistry. It must be quite fresh in your minds that for some little time past there has been a movement in certain parts of this country to divorce the two branches of dentistry from each other, and to teach scientifically only one department—that relating to operations upon the natural teeth—in dental colleges, and to relegate everything that belongs to artificial dentistry to the carpenters and blacksmiths, as something that is beneath consideration and entirely too undignified to be made a part of a college curriculum. I think the worst punishment that I could inflict upon such men, if they should lose their natural teeth (as some of them certainly will if they live long enough), would be to compel them to wear a piece of artificial dentistry made with their own fingers. Perhaps they would then begin to appreciate artificial dentistry at something near its true value. This is only an introduction to my incident of office practice. Within a few days past I have had a small epidemic of patients requiring lower sets of teeth. What I have in my hand is not particularly new; at the same time I do not believe it is in very general practice. Here are three lower sets of teeth, which possibly some of you at first view would think were mounted on platinum. Two of them are sets of gum blocks, and the other is a set of plain single teeth with a gum of pink rubber which has been bleached. This base, I really think, after many years' experience, is one of the best bases, if not the very best, for the average requirement of full lower sets of teeth that can be used. You may give it any high-sounding name that you choose. I presume, if it were in the hands of some persons, it would be given some extraordinary title from which you would get no idea of what the composition was. I took a few pounds of the purest tin I could obtain from one of the manufacturers of tin-foil for dentists' use, who said it was especially purified, and to each pound of tin I added an ounce of bismuth. It makes one of the nicest, cleanest, purest, and sweetest things I have ever used for this purpose. It will not tarnish as quickly as 18-carat gold does in the mouth. It is easily kept clean and bright with a little chalk now and then. Its other advantages are numerous. The piece which is mounted with plain teeth is made in a way which I believe is peculiar and original with me. The plate is formed of a thin sheet of wax set up on the plaster model, but before it is flasked for casting I take a dozen small gimp tacks, with half-round heads, and set them in a row upon the ridge of the lower jaw, with their heads just imbedded in the wax, and then flask the piece. In flasking it I use plaster and sand, in the proportions of about three parts of sand to one of plaster. This gives a fine surface when it comes in contact with the wax in making the mold, and it is sufficiently porous to dry out quickly. When the flask is opened the wax is readily removed; the tacks are pulled out; and when the casting is made the spaces that were occupied by the tacks are filled with the metal, so that we have a plate with a row of tacks of the same metal, which can be easily bent for attachments, standing around upon it. I only use this metal on the lower jaw and for a person young enough to tolerate its weight. I find that old people will not wear a heavy piece. Younger patients prefer weight, but the older they get the lighter the plate must be. They are less annoyed by its moving around in the mouth than by its weight. If the plate, as I have described, is made thin and the teeth mounted upon it with vulcanite, we get as light a piece almost as if it were entirely of vulcanite. The other pieces shown here are made of blocks, set before the piece is cast. There is nothing special about the casting of it; but it makes a piece with clean joints, with no spaces whatever for the accumulation of food, and is admirable for the cases to which it is adapted. Many times in casting these pieces I have found that, possibly from want of care in fitting the blocks, there has not been sufficient space left for the metal to run between the block and the model, so that when the teeth were removed I would find a flaw and the porcelain exposed. Such flaws are very easily repaired. If an amalgam is good enough to put in the natural teeth, it is good enough to repair a flaw in an artificial set made of this material, and it makes the best kind of a patch,—so neat that it would not be detected except by an expert, and possibly not by him. One (perhaps two) of these pieces has been repaired in that way, and I doubt whether any one would detect where the patch is laid in. Let me incidentally remark that these patches were made with an amalgam furnished me by Dr. Oliver about a year ago, and although I have spoken before this society in high commendation of his amalgam, as being better than any I had then used, which was a fact, I must be equally frank and sincere in using the same language regarding the amalgam he has furnished me lately, for it is without exception the best I have ever used. I believe it to be absolutely without shrinkage, and I have not seen a single filling made of it that was discolored in the slightest degree. The color is peculiar,—it has not the bluish tinge of most amalgams; it seems to be more of a grayish color; and really seems to harmonize with the structure of the tooth better in some cases than gold. I have used it for more than a year, and I think that if it were going to tarnish we would discover it in less time than that; we should not have to wait a year to find it out. Shrinkage tests can be made in various ways with certainty out of the mouth. I have been informed by Dr. Oliver of the metals and the proportions which enter into this amalgam, and they are such as have always been approved for such a purpose. In referring again to the lower sets, I can recommend that kind of work to any one who has not so far advanced that he don't know, or care to know, anything about artificial dentistry.

Dr. F. Y. Clark. Have you ever used marble-dust and sand in making a cast?

Dr. Kingsley. I have used marble-dust for molding purposes in lieu of the ordinary molding-sand, but not with plaster for flasking.

Dr. Clark. I think it is much better.

Dr. Kingsley. Perhaps it is, but as I have no difficulty in making good casts with plaster and sand, I should have to advance somewhat in order to appreciate marble-dust. Although one might think that plaster and sand in the proportions I have named would not run smooth, there is in fact a sufficient quantity of plaster to make a perfect surface. If any one cares to test it, let him mix three parts of sand with one of plaster and pour it on a piece of glass, and he will find the surface to be as perfect as the face of the glass itself. It makes a more porous mass and dries quicker. The more dense the mass the longer it will take to dry.

Dr. Clark. Don't it shrink?

Dr. Kingsley. There is not a particle of shrinkage in plaster and sand in these proportions. It is the same composition that we have used for thirty years for an investment of teeth in soldering without any complaints about shrinkage. You will bear in mind that the heat to which it is subjected in casting these pieces is less probably than 400 degrees.

Dr. Frank Abbott. While on the subject of artificial teeth I will mention a case that I had recently which may be of interest. An old lady eighty-three or eighty-four years of age, who has recently lost her lower teeth entirely, had a plate put in by some dentist which gave her a great deal of annoyance and trouble, on account of the noise made by the plate, absorption of the alveolus probably having left it quite loose. She came to me to have a new set made. I had a set made for her, but, although it fitted, there was still considerable noise, and she and her family were very much annoyed by it. Some years ago I heard Dr. John Allen state that he had overcome that difficulty by drilling holes at the points of contact of the teeth and filling them with gold. Ascertaining the points of contact by the use of a piece of articulating paper, I drilled six or seven cavities in the crowns of the bicuspids and molars, and filled three or four of them with gutta-percha, and the other three or four with gold. The noise immediately ceased, and she is very much delighted.

Dr. Kingsley. I will tell you a little trick that I have resorted to in those cases. If I am making a set of teeth for a patient who has found that difficulty with a former set, I pull the molars out of the flask, if I am using vulcanite or celluloid, and let the material into their places. I have done that many times. The patient is then masticating on vulcanite, and there is no clatter at all.

Dr. J. B. Rich. I suppose Dr. Abbott intended to say that the fillings he put in protruded so that they struck the upper teeth; they were the prominent points of articulation, and the gold could not give any sound.

Dr. Abbott. That is the idea.

Dr. S. G. Perry. If Dr. Kingsley considers this incident a very trifling one, I wish he would bring something the next time that he considers of some account. I think this a very interesting incident.

J. Morgan Howe, M.D., then read a paper entitled "Some Thoughts on Antiseptics," as follows:

The character and distinctive action of antiseptics are of special interest to us, because, among other reasons, we have to do with tissues which, owing to their peculiar situation, permit only very slight irritation without causing intense pain. It is generally admitted that the atmosphere is filled with vegetable germs ready for development and propagation of their kind whenever or wherever conditions favorable are presented. The theory of putrefaction generally accepted is that of Pasteur, Cohn, and Schwann, and it is described as a chemical process induced by bacteria, in a similar manner to the production of alcoholic fermentation by the yeast-plant. We have a long list of germicides whose applicability to the arrest of the development of bacteria has been for several years a subject of study by scientific investigators all over the world. Koch, Miguel, and others have determined with great accuracy the relative power of many drugs to prevent the development of bacteria, and on this basis and that of expediency they are mostly used in surgery. Professor Lister long ago observed that, when chronic abscesses were discharged by the surgeon, the discharges frequently became putrid and filled with micro-organisms, although the pus had before been laudable and free from them. From this and other observations has grown up the practice of what is known as Listerism. But it is beginning to be realized that there is more in the treatment pursued than in the mere antiseptic property of the drug used; and although favorable results have been generally attributed to the destroying and arrest of development of germs, yet the agents employed are now discovered to be uncertain germicides. To avoid constitutional effects, carbolic acid has been so diluted that it would not destroy germs; carbolized oil is shown to be worthless for this purpose; bichloride of mercury is unreliable as a dressing, as it turns to calomel; and peat, which has been very valuable as a surgical dressing, has been found to be itself full of germs. These facts seem to indicate that the mere question of the relative power of various substances to arrest the development of bacteria cannot alone decide the treatment indicated, where antiseptics are called for, either in general or dental surgery.

I will this evening call your attention—at the request of the executive committee—very briefly to a singular manifestation in our special practice, which I am sure some of you have wrestled with, and which reminds one forcibly of the observation of Lister referred to before. When the dental pulp becomes devitalized and sphacelate being at the same time secluded from access of atmosphere and the ever-present germs, many years may pass in which no perceptible irritation of the pericementum takes place. It seems very probable that no fermentive putrefaction—if you will allow the tautology—takes place, and that the sphacelate pulp is not a very active irritant; although after a varying interval, generally as a sequence of constitutional depression, the mephitic matter contained in the pulp-canal does become a source of irritation, when opening into this cavity by drilling through the dental tissues is indicated as the first means of amelioration; but during the time of quiescence that elapses between disorganization of the pulp and a future pericementitis, it is often expedient or necessary for the dentist to open into the pulp cavity, for reasons that readily occur to all of us; and just here, or rather from three to twenty-four hours after this simple operation, there have been presented to me the most mortifying and perplexing phenomena that have occurred in my practice. In a large proportion, if not in the majority, of cases so treated inflammation of the severest and most uncontrollable nature has set in within a few hours. It has been a matter of some surprise to me that, although the treatment of "dead" teeth and of pericementitis has not been an uncommon subject in our literature and in our discussions, so far as I am aware no mention has been made of this difficulty of practice, which was to me a recognized *bête noir* for over fifteen years, and I learn by conversation has been so regarded by some of my brethren. During this time I followed various methods recommended by the friends whom I consulted, and who told me very encouragingly that they had no such trouble. I cleaned the root-canals as thoroughly as possible; I desisted from cleansing them; I placed a stopping in the opening made into the pulp-canal, and again I left it open; I used carbolic and salicylic acids, thymol, carvacrol, creasote, solution of camphor in chloroform, oil of cloves, and other medicaments; I wet the drill and the tooth with creasote or carbolic acid to effect an early entrance of these antiseptics,—but all was disappointment and chagrin. Just when a case or two of exemption from the dreaded inflammation encouraged hope that the means of prevention was found, the next case was likely to call into use all my talent for explaining that which I did not understand, and all my resources for inducing a favorable termination of the pericementitis. I obtained the greatest exemption from this inflammation by carefully refraining from any attempt to cleanse the root-canals, and by the use of oil of cloves gently introduced. This much I surely had learned by experience, when about a year and a half ago, in comparing notes with Dr. Bödecker, he advised the use of iodoform dissolved in ether, claiming that it would effectually prevent the trouble. I have used it ever since without a single failure to prevent those changes in the sphacelate pulp which had previously converted it into such an active irritant. I at first used the iodoform in etherial solution, but have found equal parts of absolute alcohol and ether to be a more desirable menstruum, because less volatile, thus enabling me to easily introduce the medicament into the larger part of the pulp cavity without scattering the odorous powder left dry by the rapid evaporation of the ether. I have made no attempt to overcome or disguise the odor, and do not find it more objectionable than other drugs we frequently use. In the cases I have referred to it may be immediately sealed in with a temporary stopping; in another class of cases it may be covered only with the cotton, or a vent-hole may be left in the stopping, as in treating those cases in which mephitic gases are forming, or suppuration has taken place, and which have therefore passed the period of quiescence. It is a valuable non-irritant antiseptic in these cases. I do not find that it is quite sufficient to effect the cure of some blind abscesses. I have, however, in a few recent cases of the latter, had more favorable results follow the use of the peroxide of hydrogen (H_2O_2), as recommended by Dr. A. W. Harlan. In a recent conversation with the latter gentleman, I was pleased to learn that he had recognized the difficulties I had encountered, after opening unirritated "dead" teeth (because some claim to know of no such trouble), and that he had found a preventive in hydrogen peroxide. It seems to me that both the latter and iodoform must have a specific therapeutic action in all cases, entirely aside from their antiseptic or germ-destroying power. If not, why have all other antiseptics failed as preventives in the cases to which I have specially referred? I think they are both destined to be of great service in our work, and it will remain for us to discover their special sphere of usefulness. In proportion as we individualize diseased conditions and therapeutic agents we will be advancing, and new remedies will find their places and keep them, instead of being popular as panaceas for a time and then forgotten. In using iodoform I have frequently left it without being sealed in, but have had no cases of constitutional disturbance. It is quite admissible that some susceptible organizations might be affected by such doses as they are likely to get from a dental dressing, but I have not met any such. According to M. Maître, five or six-grain doses in man produce "no notable symptoms," and Lazansky used it therapeutically in quantities of ninety grains a day; but these statements should, I think, lead no one to use it carelessly.

Iodoform is certainly a decided local anesthetic, and shows itself to be so in dental canal dressings; but in the few cases in which I have used it of recently-exposed and aching pulps, it failed when applied to them to ameliorate the pain in any perceptible degree, but when it was removed and carbolic acid applied the pain ceased at once. So far as only a few cases show anything, I should conclude by these that it might be unwise to give it as much credit in this line as has been done by some who have added it to various drugs such as carbolic acid and eucalyptol. I admit that my use of iodoform in attempts to save living pulps has been very limited indeed; but I am very doubtful of its possessing such wonderful conservative properties as has been attributed to it. My idea of progress in therapeutics is that, by using one remedy at a time, we may know, when we obtain favorable results, to what they should be attributed. We *may* bring down the game with a blunderbuss, but it is more creditable and safer to do it with a rifle.

Professor Thomas Fillebrown, of Boston, then read the following paper on "Gold as a Filling Material, and its Manipulation:"

Mr. President, I desire to thank the society for the honor conferred upon me by an invitation to appear before it. I am happy to be here to-night, for the names of most of the members are quite familiar to me, and memories of the faces of many here have been my companions for years. I have also long had the pleasure of personal acquaintance with several of your members, which has been an inspiration to me all through the years of preparation for my work and my performance of it from day to day. To-night I propose to say but little of what I think might be said upon the subject of gold, and I would hardly like to be judged upon this paper alone, without regard to other points that I may not be able to mention.

Dental thought and investigation at the present time center around these three points: First, How do teeth grow? Second, How do teeth decay? Third, How are teeth saved? The first is dental physiology, and includes embryology; the second is dental pathology, including etiology; the third is dental therapeutics, and includes operative dentistry.

The purely scientific subjects have absorbed the attention of dental investigators and engaged the discussion of dental associations for a few years past, to the exclusion almost of the every-day practical necessities for saving teeth. It is well in every way that pure science is having its day. It is encouraging that so many are able to interest themselves in such subjects to so great an extent. So much has become known, also, within the immediate past that the profession could not keep up with the progress of knowledge, to say nothing of making up for the great lack in the past, without giving a great deal of attention to pure science. And now that so much of talent, education, and culture are enlisted in our ranks, and while such as Heitzmann, Bödecker, and a score of others are digging out so many of the long-hidden facts of nature and illuminating them upon the walls in full view for our study, a large share of our attention, study, and discussion must be directed to these intensely interesting and important subjects.

But teeth grew before embryology or development was thought of. They have grown while we have been studying the phenomenon of their growth, and have been decaying while we have studied the etiology of their decay; and these processes will be the same, probably, when we are all agreed in our understanding to the minutest degree in regard to them. While human nature is like itself teeth will decay, let the cause be ever so well understood, or the nature of the disintegration be settled beyond a cavil.

So we come to the third as the ever-present, ever-pressing, ubiquitous question, What is to be done to save and restore to usefulness this individual tooth? Tooth-germs will develop without our aid. The etiology and process of caries may be studied during the quiet hours of the night, or wait the coming leisure of opulence or retirement, but this tooth that is decayed, that is paining, cannot wait. It demands immediate relief. Waiting is fatal. Consequently the query, what to do and how to do it best, is the first in importance, and ought always to hold the first place in our estimation, and command our most earnest attention.

At this time I propose to consider a very practical point in operative dentistry, and ask your attention to the consideration of the subject of "Gold as a Filling Material," and the best method of using it. The luster of gold as a filling has been a little hidden of late by the loud laudations of the plastic fillings—sent forth by the disciples of the New Departure, but it is again coming forth undimmed and in all its original glory. "Truth crushed to earth will rise again." Plastic fillings are a great boon to dentistry, and are quite indispensable to a full realization of the most complete restoration of the teeth which is now possible; but that they will save any greater or an equal proportion of diseased teeth, because of their inherent qualities of compatibility and conformity, I do not think proven, and my own personal experience confirms an opposite view. Nor is the appearance of any of the plastics one whit better than gold for any case or position. There is as yet no filling found with which to fill a cavity in the teeth but what must be known to all observers *as* a filling. It appears as a substance foreign to the tooth, and unlike it. Such being the case, I submit that the smooth, polished surface of a gold filling is more desirable than the soft, greasy mass which the surface of almost every gutta-percha filling presents, and that the regal luster of burnished gold is far more acceptable than the dull, lusterless opacity of the zinc phosphates or the tin-like color of the brightest and best amalgam. In my judgment gold fulfills more of the conditions required for a filling, and is applicable to a greater variety of cases, than any other material known. It is plastic enough to conform to the most irregular surface, and cohesive enough to be solidly compacted with a force so slight as to leave uninjured the frailest wall of enamel. Most of the failures with gold are due to unskillful, careless, or over-vigorous operations. There is no manner of failure with gold that does not obtain with every other kind of filling, and in no very greatly diminished degree. That it requires more labor and longer experience to make a perfect filling with gold than with any of the plastics, goes without the saying. But, if a gold filling be as well made as may be, it will preserve all that any filling can, and endure under adverse conditions to an extent quite equal to any.

Two somewhat plausible objections are urged against gold as a filling—first, its color; second, its want of plasticity. The first has been negatively answered by showing that there is nothing else the color of which is quite as good. The second will quite as entirely disappear when the plastic qualities of gold are fully understood and appreciated. No material has been so thoroughly misunderstood, beaten, knocked about, pounded, and punched, and in every possible way abused, as pure gold. I say this advisedly, for I speak out of the depths of my own experience, and I know that thousands of my contemporaries have followed the same path. Those who have not are the exceptions of almost a former generation; and yet their understanding was no more enlightened, for to them the wonderful cohesive qualities of the metal were almost unknown.

There is fashion in medicine, fashion in surgery, and there is fashion in dentistry; we are governed by fashion; and when the mallet came into fashion it knocked us all into conformity, and for the time knocked all our better judgment into a state of anesthetic numbness. We have sought to accomplish by force what might have been better done by gentle means; for of all our servants none is more tractable than gold, if coaxed instead of driven. Recall to mind for a moment how placable gold is. If two sheets of foil be annealed and laid together, and a paper-folder be lightly passed over them to bring them into contact, their union is complete. If two annealed ropes of gold foil be but touched together, they are inseparably welded at the point of contact, and if pulled apart the gold will tear elsewhere than where united. If gold has cohesiveness to this degree, what is to be gained by pounding? Nothing in any case, so far as cohesiveness or plasticity is concerned; but much lost. If in our former experiment the passage of the paper-folder over the gold be repeated, the sheet of foil will curl up and become very stiff and hard. Malleting does the same for gold in a filling. It destroys its plasticity and cohesiveness and gives it a tendency to curl up from the sides of the cavity. This is the effect of force, in whatever form applied; consequently the less the better, beyond enough to bring the layers of gold into contact. There has also prevailed in the past the idea that the added layer of gold must be interlaced with the gold already packed by deep serrations on the plugger-points. Practice of late years has become much modified; still most of the pluggers now used have serrations much deeper than can serve any good purpose. All that is necessary for complete cohesion and solidification of gold is contact; and the only good purpose served by serration is to prevent the gold from slipping from before the point of the instrument, and preventing the instrument from slipping on the filling. My own professional experience fully corroborates this statement.

On the eleventh day of May, 1871, I had a patient in my chair for whom I had prepared some cavities for filling with gold. One was on a left inferior second bicuspid, distal surface—not coming up to the grinding-surface. The first molar was gone. It was a well-formed cavity, but utterly out of reach of direct mallet force, which I was then using exclusively. While debating in my mind how to cut away so as to accommodate the mallet, I recalled what I had heard about rubbing in gold with ivory points. Thinking steel might answer the purpose, I took an old excavator and broke it off to the proper size; heated and turned it to a proper angle; rounded and smoothed the points; then, without even hardening it, went to my patient and with hand-pressure filled the cavity in a very short time, and with as little force comparatively as I had been using before within the past year. I have seen this same filling, as well as others which I put in at the same sitting with the same point, and they were as good as when inserted twelve years before; and I should by no means be ashamed to have them pass the ordeal of an examination here to-night. I did not rub it in at all. By an involuntary effort I developed a motion, so far as I know, unique,—first, direct pressure toward the filling, followed by a slight rotation of the point on the axis of its face; then a rolling of the ovoid face of the plugger. I soon had a set of smooth, hardened, polished pluggers made which I used for many years. I had slight spasms of malleting from time to time for a while, but they rapidly grew less, and very soon the mallet was laid aside, and has never again as yet been depended upon as a means with which to pack gold.

In 1872 I filled for Dr. Ingalls, of Clinton, Mass., at a clinic before the Merrimac Valley Dental Society, at Dover, N. H., a large approximal cavity in a bicuspid. In December last I had the privilege of examining it, and could see no dimming of polish or imperfection of margin, and in every way it appeared quite as good as the day it was put in.

I had occasion at one time to report my progress with the smooth points, and made a close calculation from my records of more than 2500 fillings put in with this same set of points; and they certainly have done as good service and furnished quite as small a percentage of failures as any work I ever performed. The pressure used on these fillings I repeatedly weighed, and I found it was from two to four pounds, rarely exceeding the latter. A mallet blow will weigh from eight pounds upward to twenty pounds, on the full force of the arm. The usual hand-mallet blow used weighed about twelve pounds.

The form of gold I found best adapted for this work was a leaf of No. 4 cohesive foil, cut into five strips and rolled into loose ropes. This same form I still use; more than that works stiff; less is lacking in substance. The rapidity with which gold can be packed by this means is equal to the most rapid malleting. I came near having a relapse a few years ago when the electric mallet enthusiasm was first fully developed. So promising an agent I wished to try, and being reinforced by the then very satisfactory success of one of your worthy members, upon whose case lay two of the seductive things, I obtained an electric mallet and used it with great wonder at first, and with some satisfaction, which diminished day by day until the mallet lay, where I reckon many others now lay, in the drawer. But I would not part with my experience for many times the cost in time or money.

Time developed an objection to points perfectly smooth, which caused me to lay them aside. I found that there was so much inhibitory power required to keep the point from slipping on the rounded surface of the filling, that it made too great a drain upon my physical force,—particularly in the pectoral regions. I first adopted shallow corrugations, which prevented the slipping sidewise. These served a good purpose; but I have since adopted the very finest serrations upon the points, for the sole purpose of precision in working. The ovoid form of the face of the point, like the ball of the index finger, I find particularly excellent, avoiding the flat surface and sharp edges of the common point. The size is also important, being considerably larger for similar cases than is commonly used. The very small points used at present seem to me to be illy suited for the purpose of packing cohesive gold, for they pierce the gold and cut it, instead of packing it before them.

I feel a little as if I were bringing "coals to Newcastle," for I feel sure every one present is fully aware of the facts I have presented in regard to the working qualities of gold, and many are using it according to the essential principles which govern my practice. The form and size of the face of the plugger-point may be the only feature at all distinctive that I have presented; but the ten commandments and the golden rule need to be often repeated, and, though well understood, are often unheeded and sometimes forgotten. They must also be taught afresh to every coming generation, to whom they appear as new and living facts. So I may, perhaps, be excused for presenting familiar truths that have had a great influence on my professional life, and which lose nothing of their interest or importance by age or repetition.

President Jarvie. Have you any of your plugger-points with you?

Dr. Fillebrown. I did bring a few, so that the matter might be understood if any one should be curious to understand it further. I will say that through various influences my former set has become demoralized, and I have had some new ones made lately, but they do not fulfill my ideal. The points are not quite rounded enough, and the serrations are not quite fine enough. I would have them as fine as our best workmen could make them. The curve or style of the point has nothing to do with it. They can be formed to suit individual operators; the packing surface is their only peculiarity.

Dr. S. G. Perry. I would like to ask Dr. Fillebrown if he uses hand-pressure in the old-fashioned way, or does he rub the instrument over the surface of the gold, burnishing the gold to its place?

Dr. Fillebrown. I do not burnish it over. I simply press the gold home, and roll my point a little, not rubbing it at all. With a serrated point you cannot do any rubbing. You roll the instrument a little in order to bring all parts of the point to bear upon the gold, because the point is rounded a trifle. The fact to which I would call special attention is the small amount of pressure required to make a dense filling, upon which, if carefully made, a mallet will make no more impression than upon a solid mallet filling.

Dr. Perry. Do you use strictly cohesive gold?

Dr. Fillebrown. Strictly cohesive gold works the best.

Dr. Perry. Have you attempted to use in that way the softer forms of gold, like Williams's soft cylinders?

Dr. Fillebrown. I do not think they work as well.

Dr. Kingsley. Do you anneal the gold?

Dr. Fillebrown. I anneal it.

Dr. Kingsley. Is it annealed to a red heat in the flame?

Dr. Fillebrown. I prefer not to do that. I simply dry it over the blaze, nothing intervening between the gold and the flame. I do not like to pass it through the blaze; I prefer to pass it just above, which gives the best cohesive qualities to the gold, and I would not make it red hot. I would like to say a word in relation to the preparation of the gold. I prefer a rope rolled loosely. One-fifth the width of a leaf of No. 4 foil is the size I find to be the best. I have tried one-sixth and one-fourth of a leaf, and have settled down to one-fifth as the best amount that will perfectly condense and cohere under the instrument with the force I use. I sometimes take the ropes and string them out two or three together. The size is such that you can lay it to one side, pack it down, then fold it over and take a little more. In regard to consolidating the gold, here is a copper cent that I scraped a little with an excavator; then annealed some gold, and packed it on there with this point and the same light pressure I am talking about, until it is built up into two little cones as you see. You may rub them as hard as you please with a burnisher, and you will find they will not rub off.

Dr. Kingsley. The gold rope, when first twisted, weighs less than a grain.

Dr. Fillebrown. It is a rope four inches long and weighs less than a grain.

Dr. Perry. One of these fillings when finished will be a solid homogeneous mass of cohesive gold?

Dr. Fillebrown. It will.

Dr. Perry. Just as dense in one portion as in another; is that the intention?

Dr. Fillebrown. That is the intention, and it is the result.

Dr. F. Y. Clark. Will the doctor describe his process of rolling the gold into a rope?

Dr. Fillebrown. I use a little roller invented by Dr. Adams, of Worcester, Mass. It consists of two plates of tin, about four inches by three, attached by the edges, which are turned over, to a piece of rubber-dam of the same size. The rubber is folded on itself between the plates, and the gold rolled in the fold of the rubber. You lay in a strip of gold, and a little knack will roll it into a nice, even roll.

Dr. Clark. I have something here which may not be as good, and may be a little better. I will show it to you. You cut the leaf into any size you want, and with these two little blocks you fold it without touching the foil with your fingers, which in warm weather is quite objectionable. After folding the gold in that way I make the rope. I think these blocks work better than tin. They cost about two dollars, and may be made of celluloid or ivory.

Dr. Perry. After folding the gold in the form of a ribbon I fail to see the advantage of rolling it into a rope. The ribbon gives flat surfaces which can be easily brought in contact, and when there is contact there will be immediate union, if the gold has clean surfaces. When used in the form of a roll, greater force must be employed to break up the cells and to bring the surfaces in contact.

Dr. J. B. Rich. I am glad to hear Dr. Perry make that remark. I am glad to know that the proper method of constructing gold fillings is being recognized. I have been fighting against the method of rolling the foil into ropes and pellets before it is introduced into the cavity during the whole of my professional life. It is a clumsy and roundabout mode of performing the simple mechanical act of forming a thick, solid mass out of a number of thin layers. Why should those thin layers be crumpled up and bent into a mass of cells with all the disadvantages which that condition produces? Every bend that is made in the foil after it is annealed is a disadvantage, for in proportion as it is bent will it become hard and unyielding in its texture, and its formation into a solid mass will be made difficult. Then, when the rope or pellet is to be consolidated, these cells are crushed out again and another series of bends made in it to render it still more unyielding, when it is to be fitted to the walls of the cavity, and ought to possess the greatest degree of adaptability of which it is capable. I have never been able to understand why it is done, for I am loath to believe that those who use foil in that way do it because they cannot place a flat strip in the cavity with the same facility that they can a rope or pellet, as that would indicate a want of dexterity, which is an important element to be acquired by those who desire to be skillful in the construction of fillings. The true method of constructing a filling of foil is to place two flat surfaces together and bring them in close contact over their entire surface by pressure. If cohesive gold is used, a slight pressure with any smooth, hard substance will cause the two flat surfaces to cohere and become as one mass of metal. If gold foil is used, say No. 4 (I mention No. 4 because that is the number I prefer), it should be folded so that there will be eight thicknesses, and then cut into strips the width of which should be narrower than the orifice of the cavity; so that it may be introduced without being bent and then laid flat, either on the bottom of the cavity or on the gold that has already been placed there; and in this manner layer should be placed upon layer, and each one consolidated separately, until the filling is completed. The pressure must be applied over the whole surface of each layer of gold, before the next one is added, and it will not signify whether it is done by simply pressing a flat surface upon the gold, or by rubbing it with a smooth, rounded surface, so as to burnish it down solidly. Either method will produce a solid, homogeneous structure; and it must be distinctly understood that all the consolidation that can be produced upon each layer or particle must be accomplished before the packing instrument is removed from the surface of the gold. The construction of fillings by burnishing one piece of gold to another already secured in the cavity is not a new method. Fillings have been formed in that way ever since the introduction of crystal gold, which was the first cohesive gold that was regularly supplied to the profession. This mode of constructing fillings is only possible with cohesive gold. I am also glad to know that another of the methods I have advocated for a number of years, often against considerable opposition, has been recognized here to night as a correct principle,—and that is, that gold fillings should be made solid and homogeneous throughout the whole of their structure, and that they should touch the walls of the cavities with a tight joint at every point. These conditions can only be obtained with cohesive gold.

Dr. Fillebrown. I see that I am perhaps misunderstood. Of course that turning motion does not apply to these serrated points. You do not want to turn a serrated point; you roll it in order to bring all parts in contact, but you do not have any turning of the point. I also wish to say that I described this simply as a possible method, not saying but what other methods can be used in combination. I do use gold in larger quantities and larger forms. I take a whole sheet and roll it into a rope, and cut it into various lengths, one-third or one-quarter of an inch. I would not wish to be understood as confining myself to this one method, or saying that this is the only method that ought to be used. The mission that I proposed for myself to-night was simply to describe this one method, which has considerable influence in my own practice.

Dr. A. H. Brockway. The subject of filling materials seems to be an inexhaustible one, and has often been provocative of not a little difference of opinion among us. I think it safe to say, however, that from all the smoke and confusion which has characterized its discussion in the past few years most of us have emerged to the conclusion that in a great many cases gold in some form is a most excellent material for filling teeth. It has its marked limitations, and this fact accounts for very many of the failures which have attended its use; yet I believe that in the hands of skillful men, with proper instruments, it fulfills the purpose of a filling more satisfactorily in a large percentage of cases than anything we have so far found. I have said in the hands of *skillful* men. What proportion of the dentists in practice are really skillful? I will not undertake to say; but I know that some of them never, even by accident, make successful operations with gold, even in favorable cases! What, then, will they do in the difficult cases which present? What shall such men use? They must have materials adapted to their capacities, and here the plastics, like amalgam and the preparations of zinc and gutta-percha, serve them and their patients most usefully. The plastic materials are often indispensable to even the most skillful. There are many cases where it is not possible to fill and save the teeth with gold. There are still many more cases where it is not advisable to undertake to do so.

I have been much pleased and interested with the paper of Dr.

Fillebrown. As I understand it, his remarks have referred mainly to the manipulation of cohesive gold, and he has given us some excellent ideas in regard to the forms of instruments best adapted to its use. I will venture to suggest what I think to be an improvement in the handles of plugging instruments, and that is that they should be made of wood or of some similar substance. I have for several years past made almost exclusive use of such handles, and find them very desirable; they are far lighter than steel, more pleasant to the touch, and can be held with more firmness, and yet with great delicacy. By employing a variety of colored woods or vulcanite, a distinguishing character is given to each instrument, which is an obvious advantage.

While I am on my feet and while our attention is being directed to the best form of using cohesive gold, I wish to say a word in commendation of Watts's crystal gold. Although it has long been used almost exclusively by some of our best operators, yet I am surprised to find how few dentists comparatively are familiar with its manifest excellence. In my hands, I must say, it serves a purpose that is all I could expect from gold, and I feel that I am doing a good service in directing more attention to its admirable qualities.

Dr. J. F. P. Hodson. I was asked to speak to this paper to-night, and I had supposed I would not have anything whatever to say; but several ideas have presented themselves to me during the reading of the (to me) very delightful paper; and among others was the fact that crystal gold, which perhaps most of you know is the form I have used to the exclusion of all others for fifteen or twenty years, carries in its manipulation very many of the ideas that are advocated by Dr. Fillebrown. One is the ease and delicacy of its introduction. It is best manipulated by the very "weaving" force that he speaks of, rather than the cast-iron banging of heavily-directed pressure, and it makes its adaptation to the walls of the cavity so minutely and so waxily, so to speak, and above all the wall surfaces of the filling, notwithstanding that waxiness and delicacy of adaptation, are absolutely solid. It makes, moreover, a steel-like hardness of free surface that cannot be gotten by any other gold I have ever seen. I want particularly to emphasize this strong point of surface hardness. For a grinding surface I can scarcely imagine it to be equaled. It requires careful handling, which it sometimes does not get, because, being soft and waxy, it is used very much as wax would be,—a large mass is put into a cavity and jammed or plastered there. If failures come in its use, they are likely to be from such cause. I never use it in such a way. I am as careful to build it up from the first piece as I should be with any other cohesive gold, never allowing the least movement of any sort from one end of the filling of the cavity to the other. It does not seem to me that there is any necessity for failures with crystal gold, and it does seem to me that it accomplishes in my hands all that I could possibly accomplish with any other gold. I have been asked to bring here to-night a little instrument that I have had a great deal of comfort in using during the past year or two. It is for holding the first pieces of gold introduced, and for looking at them at the same time in a mirror, in deep approximal cavities that are hidden out of the way. The instrument was made for me by The S. S. White Dental Manufacturing Co.

President Jarvie. I believe Dr. Bogue is full of something. We shall be very happy to hear from him.

Dr. Bogue. I believe the subject, as announced this evening, was "Gold as a Filling Material, and its Manipulation." It has been said that gold is as good as anything for a filling, which I believe is conceded. So is a silk dress as good as anything for a lady, but how to get the silk dress for all does not appear. We need woolens and calicoes, and we need the plastics to take the place of extraction. I think we certainly have three distinct kinds of gold foil, that we may call cohesive, semi-cohesive, and non-cohesive, or, as is usually said, soft gold. I demur at the nomenclature. Each should be treated in an entirely different manner. In reference to cohesive gold, I have only to express my thanks, as several gentlemen have already done, to Dr. Fillebrown for his paper and for the information which it contains. It is a reinforcement of what Dr. Shumway told us long ago, and it is a pleasure to hear the experience that Dr. Fillebrown gives us. But, as I look at the subject, it is not every dental cavity that needs to be treated in that way. Possibly the majority of the cavities that we are called upon to treat are proximal cavities, and I do not consider if those cavities are confined to the spaces between the teeth, that any special strength is needed in the filling which is inserted into them. I therefore hold that non-cohesive gold can be much more easily placed in those cavities than cohesive gold, and just as efficiently. I think there is where the old operation of filling teeth with wedge-shaped instruments had its greatest advantage. I think the cavities we find on the grinding surfaces of the molars and bicuspids can also be readily and easily filled with non-cohesive gold, and that it serves every purpose of a filling. We come now to a class of cases entirely different, where wedging cannot be resorted to, and where we must rely upon the cohesive properties of the gold of which we have only heard this evening,—namely, combined cavities, reaching over from the approximal to the grinding surfaces of the teeth. As is well known by my brethren in this society, I have for years been in the habit of using cylinders, and since the mode of using gold is under discussion, perhaps it will not be amiss for me to state briefly how I might go to work to fill approximal and grinding surface cavities,—bearing in mind, as I mean to, that there is a limit to everybody's patience and to the powers of endurance of both operator and patient. I concede readily, without discussion, that we must go back to nature for our highest models of every sort, and that the divine form of the human tooth is the best model we can take. When we shall have restored a decayed, broken-down tooth, not necessarily to its original form, but to the ideal form of a perfect human tooth, we shall have done the best we can. How to accomplish that end with the least possible expenditure of force, pain, and time is the problem. I am quite in the habit of using cylinders for approximal cavities; and if those cavities are deep, reaching nearly or quite to the gum, or below it, I am also in the habit of putting in a bit of steel, shaped like a sickle lancet, as a matrix, for the purpose of having perfectly solid sides to fill against. Imagine approximal cavities in a bicuspid and a molar. Imagine your bicuspid pretty largely decayed, but the cavity entirely confined to the approximal side, and imagine your molar decayed through to the grinding surface. I will put in a separator and draw the teeth apart to the distance of the thickness of a visiting card, or three times that distance perhaps. I will then fill my bicuspid, and finish it, leaving it contoured. I shall probably put in two or three cylinders, and I will probably finish up with cohesive strips, somewhat after the fashion described this evening; although I confess that, as to those particular plugger-points, I don't know them. I restore the rounded knuckle which a bicuspid tooth ought to possess. Now I put into the space between the teeth my matrix of steel, shaped like the blade of a knife, thick at the back and running to an edge, laying the back against the gum. I then proceed to fill the molar with cylinders,—filling perhaps two-thirds of the distance with cylinders made of very soft but cohesive foil. I am not altogether satisfied with the foil I get. The best foil I can obtain is cohesive foil which I have kept for a year or more. I am aware that it becomes coated with the gases of the atmosphere when so kept, but I do not care; the moment I want cohesion in that foil I can produce it to any extent; and until I want cohesion I do not want clogging; I do not want it to curl up as has been mentioned here. But, bearing in mind that I start out with the theory that the first third of this approximal cavity can be filled without any regard to strength, then I do not care much what gold I put in. I use non-cohesive if I please; I prefer that it shall be non-cohesive from long standing, or from contact with ammonia vapor, rather than that it should be treated in some unknown way to make it non-cohesive. There are some things in that connection that we don't know much about. If the gold has been put non-cohesively into the first third of the cavity, I am sure there is an accurate adaptation to the walls, and I can then put cohesive gold upon that exactly as it has been put upon the penny that has been shown to-night. I get a certain amount of cohesion, and from that onward I will go with positively cohesive gold. Another point,—has it been noticed by gentlemen in their operations with gold which has been cohesive, but which they have a long time had in stock, that it will act very much like strictly cohesive gold, in that a blow of the mallet, or a sudden pressure of the elbow, brings about a certain amount of cohesion? It has seemed to me that it does; and the explanation to my mind has been that the interior of the laminæ of the gold is oftentimes forced out into contact with other laminæ of gold, resulting in a pretty solid mass. I have drilled holes in a steel plate and filled them with such gold; then driven these plugs; and I have found an amount of cohesion that would astonish those who have not made that experiment. Going back to the approximal cavity, after filling the first third of the molar tooth with non-cohesive gold, and the grinding surface cavity perhaps with non-cohesive or stale gold, I will connect those two portions with the most strongly cohesive gold I can get,—and I prefer to use rolled gold for that purpose. If those teeth are separated by some mechanical means, either by wedges or a screw separator, the gold can be contoured, even exaggerated. I do use the mallet for that purpose; and when I am done I use a melon-shaped burnisher to finish the grinding surface cavity; then burring down and burnishing again. I then pass a sand-paper disk around the margins, and I have almost a complete contour. The cervical margin is then whittled with a gum-lancet of a sickle shape, so that I am sure it is just flush with the tooth and does not project. I take off my separator, and my filling is finished; and it has been accomplished, I think I may say, in from half to two-thirds of the time that similar operations used to require a few years ago. I judge of that mainly from the work I used to see from the hands of our friend Varney, some of which I have in my own mouth, and some from Dr. Webb and others, that is quite to my hand when I want it. As to the results of fillings put in in this rapid way, perhaps I had better not say too much. Our friend, Dr. Hurd, used to say, "When gentlemen speak of *their* patients, they must remember that the critters have legs and they use them." I have seen a few of my fillings lately that are from fifteen to twenty years old; so that if the teeth are good, and are well cared for, perhaps the filling will last. Dr. Rich alluded to one point that I should like to call up again. It is in reference to welding. By referring to papers that have been read here in past years, it will be noticed that all metals whose surfaces are pure and clean are susceptible of welding at common temperatures. I believe that machinery, when not well oiled, sometimes stops because of the welding that takes place upon the axle-bearing.

Dr. J. B. Rich. Metals will weld when their surfaces are kept pure and unoxidized. That discovery I made when I was a young man, forty or fifty years ago,—the welding of lead and tin, and several other metals. You cannot weld gold to steel very well.

Dr. Bogue. I think it must have been fully forty or fifty years ago that it was noticed by machinists that their machinery sometimes stopped through cohesion of the axle with the bearings. Since that time the bearings have generally been made of some dissimilar metals,—Babbitt's metal, gun metal, or something else.

A word or two in reference to gold and what has lately been said to me about its preparation. I am told that the manufacturer of a gold foil which is extensively used by dentists will take an ingot which has been cast by himself; will experiment with a piece of that ingot, and find what he calls the temper of the gold, and when he is assured of its condition he will cut that ingot into three pieces,—that ingot, as I am assured, being pure gold; sold by the assayer for pure gold. He cuts it into three pieces, and of one piece he makes what he calls soft gold, of another he makes a more cohesive, and of the third piece he makes the extra-cohesive. I am informed that nothing whatever is done to that gold after it leaves the melting-pot different in one case from the others, and that we may regard all those three specimens as absolutely pure gold.

Dr. Brockway. How does he obtain the different results?

Dr. Bogue. He tells me it is done by the use of the different fluxes.

Dr. Rich. How can he use different fluxes after having cast it in one ingot?

Dr. Bogue. One ingot has been cast and tested, and its temper found; the ingot is then cut into three pieces; one of the pieces he will melt and flux, and the second piece he will melt, perhaps, three or four times and flux differently.

Dr. Rich. It is not the same, then. He may melt those ingots in different fires and thereby produce different results. Some fires may have sulphur in them, and some arsenic.

Dr. Bogue. Yes, or phosphorus. Now, the question is whether we may regard that gold as chemically pure?

Dr. Rich. No.

Dr. Bogue. The next question is, supposing it is not chemically pure, may we with entire propriety use it in our work? It is certainly true that the three specimens of foil over which I have been working for a number of hours within a few days showed most markedly different characteristics. That which was called soft had almost no crepitation,—no more than folded Japanese paper when taken in the hand and shaken. The second showed a little crepitation. The third was distinctly what we call tinny, the last being the most cohesive. The first no degree of heat would make cohere; and there is where I took a note when Dr. Fillebrown was speaking. The manufacturer says that is chemically pure gold.

Dr. Rich. You never saw chemically pure gold.

Dr. Bogue. It will not cohere, and you cannot make it cohere. The second coheres slightly; the third coheres so strongly that you cannot pull it apart,—it tears. The first, I conceive, is gold that we may use in all grinding-surface cavities, and with very little pressure, and with the expenditure of very little time and trouble, may procure good fillings, that will retain their polish fairly. Lastly, if Dr. Fillebrown has succeeded in discovering a royal road to good cohesive fillings, with so small an amount of trouble, as we hope he has, I shall be the first to make my acknowledgments.

Dr. J. B. Rich. The consideration of subjects of this kind is certainly both interesting and instructive; and I do not think an assemblage of dentists could be better employed than in their discussion. From the remarks I have made this evening in relation to gold fillings, I do not wish it to be understood that I use nothing but gold for filling teeth. My remarks had reference to the proper mode of forming gold fillings when they are being inserted. I have given a sketch of what I consider the proper philosophy of their construction. It has been stated over and over again, at the meetings of this and other societies, that in the practice of our profession we are often obliged to do many things that are not up to the degree of excellence that a high standard requires. This is a principle which I have never recognized, and its entertainment is destructive of the best interests of our profession. Where dentists meet together for consultation, and to impart what information they can to each other, expediency should not be discussed. We are not improved by being told that one man uses soft foil for certain parts of the filling he wishes to make because, with his degree of skill, it saves time, and he can introduce it so much easier and quicker than he can cohesive gold, although he admits it will not make as good a filling. Statements of this kind do great harm, and may induce some of those who hear them to do likewise when they are in a hurry. The object of these meetings should be to describe and discuss the best means of performing dental operations in the most perfect manner, and according to the best known principles. Such discussions could not fail of having a healthy and stimulating effect upon all who might have knowledge of them, and lead to progress and elevation. Everything that has been said about crystal gold this evening was true of it when it was first introduced to the profession. For several years I used it exclusively in the place of foil, and I abandoned its use with great regret only when its quality had deteriorated and it had become unreliable. This was of course the fault of the manufacturer. I am informed by Dr. Hodson, Dr. Dwinelle, and other gentlemen who use it, that as now made by Mr. Watts it is entirely reliable. I am very glad to know that, for our profession owes a large amount of gratitude to it; for with the introduction of crystal gold, and the recognition of its capabilities, new ambitions were created, and a great advance was made in the process of filling teeth. It had, as then made, many more valuable qualities than any other substance that had been employed for that purpose, and it seemed to be the desideratum that the enthusiastic dentist had longed for, but never expected to acquire. Its adaptability to the construction of fillings was a revelation, and the ease and facility with which it could be formed into a dense, hard, homogeneous mass was a surprise to those who used it for the first time. It could be consolidated with a comparatively slight pressure, that rendered many ideal operations possible by its use which would not have been even attempted with any other form of gold; and by using small particles it admitted of a delicacy of manipulation in contact with frail structures that was truly wonderful.

I wish to say a few words on the use of cylinders for filling teeth. It does not matter what kind of foil they are made of; there is no possibility of making solid or tight fillings with them. They cannot be packed into a cavity without there being spaces formed between them which it is impossible to fill or make tight. The test of the air pump or microscope will demonstrate this condition of the filling so made. If it is important that a filling should be tight, then this method is a very imperfect and slovenly way to fill cavities.

Dr. Bogue. Allow me to express my thanks to the doctor for the compliment.

Dr. Rich. In speaking of the use of cylinders, I did not intend to reflect on Dr. Bogue or any other gentleman. I did not intend to be personal, and I hope no one will ever consider that I mean to be so. When I am speaking about principles or modes of practice, I think I am above anything of that kind.

Dr. Bogue. I hope Dr. Rich will not think there was any irritation whatever in my remark. But when we advocate the use of cylinders, we are simply following out the practice which has been indorsed by so many able men in our profession that it is scarcely becoming in him to trample upon them so rudely. In regard to the absolute fact of the solidity of these fillings, I do not believe there is any question. That is a question that has been discussed from time to time in connection with fillings made under hand-pressure and mallet-pressure and other pressure. The question is one of accurate adaptation, not of solidity or hardness. A few years ago, wishing to test the relative value of different fillings, I sent around a pretty large number of teeth to gentlemen whom I considered the best operators, or as good as any, in New York City, with a request that they fill those teeth with gold in their own manner and return them, and whatever expense was incident to that operation I would pay. Quite a number of my professional friends acceded to the request, and I may say all declined compensation; but a number of gentlemen declined positively to do any such thing; and I never concluded the experiments I began with reference to the accurate adaptation of gold fillings.

Dr. Brockway. I would like to correct any wrong impression that may go abroad from the remarks of Dr. Rich in regard to crystal gold. He speaks of its excellent quality as at first introduced and of its subsequent deterioration. I do not know what condition it may have been in at any time, but I know that at present it fulfills all the purposes for which it is intended most admirably.

Dr. Rich. I did not mean to have said that. I believe they make it now as well as they ever did; but there was a period when everybody had to abandon it because of its deterioration.

Dr. Hodson. It is not only as good as it ever was, but it is infinitely superior. It used to be made by the aid of mercury; then by the aid of sugar candy. In those methods they considered they had the best results.

Dr. Rich. The best results were produced by electricity.

Dr. Hodson. It is now entirely produced by electricity, and it is an absolutely certain material.

Adjourned.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular meeting June 5, 1883, at 8 o'clock P.M., the president, Dr. A. L. Northrop, in the chair.

Dr. James E. Dexter read a paper on "The Cap Plate."*

"Incidents of Practice" called forth the following remarks:

Dr. W. T. La Roche. Twenty-six years ago a lady called upon me whose teeth were so loose from the effects of tartar that she supposed she would be compelled to have them extracted and an artificial piece made. I advised her against extraction, and cleaned the teeth to the best of my ability. I have kept them clean, with her assistance, for twenty-five or twenty-six years, cleaning them from two to three times a year. Her teeth are now free from tartar, and, although she has had one or two severe fits of sickness during this time, she has all the teeth, except two or three, that she had in her mouth when I first cleaned them.

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* See DENTAL COSMOS for July, 1883, page 344.

Dr. Odell. One of our most celebrated physicians came to me about fourteen and a half years ago. His teeth were all loose, and he came with the same expectation that the lady Dr. La Roche has mentioned did. He said he hoped to save them for the balance of that year, but he supposed he would then have to come to artificial dentistry. After treating him from the Riggs stand-point pretty thoroughly—he said he never had anybody go through his mouth quite so thoroughly before—the teeth all got tight again; that is to say, the gums got hard around the teeth. In the course of the following two years he split one of his molars. He had one molar above, standing alone, with the point of one below striking it in the center, which finally split it in two, and he came in one day with the living pulp quivering between the sides of the tooth, which were lying apart perhaps three-sixteenths of an inch on the grinding surface. An amalgam filling that had been in there had crumbled away. I washed the split with warm water and salt; touched it with a little creasote; tied it together with a ligature of silk; applied a solution of gutta-percha and chloroform; then covered the surface with gutta-percha, and let him go. He was perfectly comfortable for two weeks, and then he came to say that he thought that string smelt bad. I renewed the string, and gave him an appointment about one week from that time. He came, and I put a band around that tooth, drove it home with a mallet, burnished it down at the edges, and filled the tooth permanently with amalgam, first protecting the pulp with oxyphosphate or gutta-percha,—which, I do not remember. The tooth was in the mouth for two years after that, but, being loose, and the band making it a little bit thicker, it was difficult to keep it clean, and gradually calcareous deposits worked down around the root. It got loose, and two years after he went to Colton, took gas, and had it extracted, which he could have done with his finger and thumb. During all these years he came in two or three times a year (perhaps four) to have his teeth cleaned. Until the last two years he has followed this practice regularly, coming in, I should say, from two to four times a year to have his teeth cleaned and to see if any fillings were needed. But the last two years he had neglected to come, and some two or three months ago he came in with the left central and lateral so loose that they just stood in by the tips of the roots, with any quantity of tartar on them. I cleaned them up again thoroughly, spending several hours and several sittings on them. I had to put a ligature on them to keep him from pushing them out with his tongue. There were two or three teeth gone at the sides, and inside of the jaw appeared to be points where the roots of the missing teeth had been exostosed, leaving protuberances in the gums. There were others on the living teeth. I made a gold plate for the lower jaw to fit as accurately as possible, leaving room for all these little lumps. Then I covered that with a thin layer of rubber, letting the rubber come against the backs of the lower teeth that were loose and three or four teeth on each side. Then I made, at a place where the first bicuspid was missing, a hinge arm, to socket into a clasp that went over the cuspid on the left; a gold bar being fitted to the front of the teeth,—it being easily loosened for the purpose of taking the plate out to clean it. He has had those teeth in that condition, held by the plate behind and the bar in front, for about two months. He expects to go to Europe soon, and I am making a second bar, for fear this may break down. The pulp in the tooth that was extracted was alive, nothing more holding it than, perhaps, one-sixteenth part of an inch of gum.

Dr. Bödecker. Gentlemen, up to about nine years ago I took very little stock in the theory that any teeth would grow tight again that had once become loose, believing that when teeth became so far affected that the alveolus was nearly absorbed there was no hope for them. But about that time an Irish gentleman, then about fifty-five years of age, came to me with his six lower front teeth quite loose. He asked me if I could do anything for them. I said I could do nothing but clean them, and that in the course of time they would drop out. It was about the time that Dr. Riggs published an article in the DENTAL COSMOS on this disease. I cleaned the gentleman's teeth, and several months afterward he came back with them in a very much worse condition than before. I commenced to clean them again, and found that one of the centrals was so loose that I had to hold it. I made a little plate, with an arm in front, and tied the central, I believe, to that plate, because that would not stay in position, while the others did. I used, I believe, aromatic sulphuric acid; kept the teeth very clean, and applied some astringent, and to my surprise in a few weeks those teeth got a very great deal tighter. I began to get hope, and the patient had more than I did. I treated those teeth perhaps three months, and at the end of that time three of the front teeth were perfectly tight, although the central was still a little loose.

Dr. Atkinson. It is rather astonishing to me that each individual assumes that his was the only case of the kind that ever occurred, when I have been talking about that thing for years, and telling and showing you how I take an impression and build up the lost tissue on the model, having the latter, as I have always said, a little larger than the new growth is desired to be; then making the attachments so as to form a pocket inside and outside of these bare roots of the teeth, where the alveolar sockets are gone externally and internally. I have described that many times, and I have a number of cases that are perfect successes,—one where the bone was removed and the soft parts very much reduced, three of the teeth being without pulps and the rest having pulps. New processes were built up around the pulpless teeth. That is a case I have reported a great many times. The patient is a young lady who was attending the Packer Institute, and who lives at Sag Harbor. Dr. Monroe, of Brooklyn, brought her to me. I removed the external and internal plates from the right inferior second molar clear around to the posterior aspect at the left second molar. That case can be seen. I defy the best anatomist to detect or surmise that the tissues there reproduced were not the original tissues, and they are attached to the cementum on teeth that are literally black. That is only one case.

Every man who thinks that a deposit of lime is the cause of the removal of the alveolar process from the roots of the teeth may revise his conclusion, for there must be a pocket in which a solution of lime-salts is held before it can become tartar at all. If tartar is found there it is the result of inflammatory action. Tartar is never the cause of the loosening of teeth. It is the result of a want of nutrition in the locality where the festoon lies in the gum; there is a want of proper or equal alimentation; the gum slips away from the tooth, and you have a pocket where foreign matter collects. It is precisely the same as with the nails. If the nail is not properly held by the soft tissue, an inflammation is set up and you have a hang-nail. It is mal-nutrition that lies at the foundation of these cases.

Dr. ——. Is not a proper use of the tooth-brush, which means dental exercise, a good remedy against loosening teeth?

Dr. Atkinson. It is, if the brush is used properly. Some say a hard brush is proper, and some say a soft one. A hard brush is admissible only in cases of very hard gums, that do not need any kind of stimulus but use. In civilization we need the brush more than it is needed in a savage state. If you tell parents and nurses to give the children all the hemlock gum to chew that they want, so as to give the teeth and gums exercise, you will find that nature will take care of them herself. I should advocate brushing to harden the gum, so that it will not admit of that pocket. Such a condition comes, I think, from the tissue running out its line of life, and apparently creeping away without any inflammatory process, but a simple wasting away.

Dr. ——. Like an abscess?

Dr. Atkinson. Yes, an abscess; that is the very word.

Dr. Spooner. The proper way of using the brush is to brush down and up, with a stiff brush, in a careful manner, so as to remove the food from between the teeth, which is the cause of the trouble. By so doing you will keep the teeth tight and the gums hard. You do not want to select a soft brush, because it grows softer every week you use it. Better take a rag than a soft brush.

Dr. Atkinson. The real point is to brush the gums on to the teeth, not off. Brush the upper teeth down and the lower teeth up, and never brush across. I have seen old people who had actually cut the tooth entirely away by brushing.

Dr. ——. The teeth are elongated by cutting away the investing membrane with the brush. I had a case of that kind; I told the patient he had brushed his teeth too much in his day, and showed him that he had made a grand mistake.

Dr. Bödecker. Dr. Atkinson has stated that the loosening of teeth, or the beginning of it, never was caused by calcareous deposits. I can testify to that, because during the last three or four years I have made very careful observations into the apparent cause of this trouble. Only last week a gentleman came to me, a patient of mine, who had been abroad for two years and six months. His teeth were in a terrible condition; the deposits around them were, in some places, at least a quarter of an inch thick. He said he disliked to go to a European dentist for fear they would spoil his teeth. If he had been in this country he would have had his teeth cleaned every six months. I removed the calcareous deposit, and under it found the gum in a perfectly normal condition. Some years ago Dr. Mills advanced the idea that it was necrosis of the jaw or alveolus that caused this condition; but I can say that, although I have seen it in connection with this disease, I do not believe it is the starting-point. I agree with Dr. Atkinson that it is always mal-nutrition; and when patients are in bad health they are more apt to have this disease than otherwise.

Adjourned.

The society held a regular meeting Tuesday, October 2, 1883. The president, Dr. A. L. Northrop, called the meeting to order, at 8 o'clock P.M.

"Incidents of Practice" called forth the following:

Dr. Latimer. I have a case to bring before you which will interest you, especially those of you who extract teeth, or who may find it necessary to have teeth extracted. The case is one in which a physician extracted the root of a lower dens sapientiæ for a woman, she being in a reclining posture, though perhaps as nearly erect as we ordinarily have our patients for the extraction of the lower teeth. Instead of using such forceps as we would, he took Physick's forceps, which has no grasp, but which merely slides in and forces the tooth out. The patient was under the influence of ether. There was no proper bifurcation to the root of this tooth. The roots were flattened longitudinally, and it snapped out of the forceps and was not to be found. The patient recovered sufficiently to talk, and said she was all right; but about twenty minutes later she complained of difficulty in breathing, and finally, in about two weeks thereafter, she was sent to the hospital, and there Professor Weir, who had had a case something like it,—of a man who insisted on having his own way, which led him to his death,— was glad to get a case of a similar nature. The woman consented to an operation, and tracheotomy was performed. Several instruments were resorted to unavailingly, until some one suggested a long wire. They took a long wire, doubled it upon itself and twisted it, leaving a loop on the end; that was passed low down in the bronchus, and the loop caught over the tooth so as to bring it out the first time it was applied. You will remember that one of our best surgeons (Dr. Sayre) on several occasions used an instrument with bristles formed into loops at the terminal portion of the bougie, and one of those loops would catch upon the article lodged in the bronchus and bring it out. That device was tried in this case, but did not answer the purpose. The patient is now doing well, and probably will soon be discharged from Bellevue Hospital. I want to give a caution from my own experience in the use of Physick's forceps. I have used them for years, more especially in the extraction of molars. In a case I had some months ago I used them for loosening a third superior molar, and, to my horror, I pushed off a considerable mass of bone. The bone and gum adhered to the roots, and made it necessary to remove about three-quarters of a cubic inch of the adjacent tissue, much to my disgust. But I saw the case about a week ago, and you would hardly know from its present appearance that there had been any loss of tissue at all. I speak of it in order to caution you, for it is possible to do harm with this instrument,—not so much on the lower jaw as on the upper.

In the treatment of abscessed teeth I have used, with about the same degree of success as with carbolic acid, bichloride of mercury, at a strength of about forty grains to the pint of water, or rather mixed with alcohol, water, and glycerin.

President Northrop. How do you use that?

Dr. Latimer. I inject and inclose it in the cavity. The systemic dose of bichloride of mercury is about one-tenth of a grain and if this solution should escape into the mouth it would be less than an ordinary dose. In one case, where I elongated some incisors and cuspids, I put in a lot of small screws and filled about them with amaglam, and at last accounts the case was doing well. I speak of it in order that somebody else may remember it when a similar case occurs.

Dr. Bödecker. The incident that Dr. Latimer has related calls to my mind a very aggravated case of quackery that occurred a short time ago. About two weeks since a very healthy young lady was brought into my office, by a patient of mine, suffering the most excruciating pain. Her friend told me that she had been to some "Cheap John" to have a right upper first molar filled The operator had placed the amalgam directly upon the exposed pulp, which of course became inflamed in such a way as to produce this intense agony. I made an opening with a drill, and as soon as the blood came away, and I had rinsed it out a little, the pain in her head over the right eye was gone. I took the amalgam filling out, and when I had done so I saw that the pulp must have been exposed when the tooth was filled, because there was blood on the amalgam, which was protruding into the pulp cavity.

A very similar case, only worse, came into my office from the hands of the same person. He had built up a right lower lateral, and about two weeks afterwards the patient had an abscess. He said that the moment the oxyphosphate was put into the cavity it hurt him, and he had pain all along until two weeks later, when a very severe alveolar abscess was developed. He came into my hands, and I had to take that lower lateral out. It was almost out,—merely hanging there. The oxyphosphate had been pressed into the pulp chamber, directly against the nerve. This patient did not get over the results of this sort of dentistry as the lady did, as his jaw became necrosed, and he lost a small portion of it, although to-day all the other teeth are in perfect condition.

President Northrop. The subject for to-night was to have been loose teeth.

Dr. Latimer. I wish to raise a cry of distress under the head of loose teeth. Five patients came to me in one day last week, all of them having pyorrhea alveolaris. I really do not know what is best to be done. I accept Dr. Black's theory. I believe he claims that the deposit upon the roots of teeth is directly from the blood. I accept that; not that I know it is sound, but tentatively, as I would any other truth,—ready to be told better; glad to be told better. Now, if this deposit is directly from the blood, there must be some systemic cause for it. I do not claim that my observation is perfect, by any means. So far as my observation goes, however, I believe that lymphatic temperaments are more liable to have pyorrhea alveolaris than others. In the cases of people who have lost their tone, and in whom vitality is low, tooth after tooth will become loosened, and the bone will be missing when you look for it. The gum lays down properly, but there will be a purplish appearance, and when you press upon it with the finger, out comes some pus. You wish it were otherwise, and do not feel sure that you can make it right. Why not? For the reason that there is a systemic cause that is beyond the reach of our instruments. Dr. Riggs's theory is that all that is necessary is the removal of the tartar and the dead margin of the process. I would like to have him find the process in some cases I have had. I could not find any process. There may be some somewhere, but I could not find it. I passed up the Riggs instruments as far as I could, but there was no proper process there. I think it must have been removed by absorption. That the lost process can ever be restored, I doubt. That a better condition may be brought about, I do not question. Patients invariably say they feel well, and the teeth will feel comparatively firm; but if they have a cold, or have anything the matter with them, then those teeth become loose again. I think that is the report that we generally get from our patients. I am using carbolic acid and salicylic acid, the saturated solution, or an excess of salicine. I pass that around the roots. Taking what we call a nerve plugger, having it dry, and waxing it a little, so that the cotton will adhere to it; wrapping a few fibers of cotton around it; wetting them in a glycerin and salicylic acid solution, or in carbolic acid or iodide of zinc, I pass that around the teeth to bring out the little loosened margins. But after all I do not feel as though I could promise the patient a good thing. A patient of this class came in yesterday,—a teacher, with health run down and not many years to live, I judge, from her appearance, paralysis at times affecting her now; nervous, as we call it, and evidently with no healthy tissue in her. Now, how can we make any local part healthy when the whole system is run down and degraded in tone? I wish some gentleman who is hopeful and knows about it would give us a panacea for this trouble.

Dr. Bödecker. I have little to say to-night, as this subject of loose teeth comes up a little too early for me. I am preparing a somewhat extensive paper on the subject, and I am not quite through with the experiments pertaining to it. But this I can say to Dr. Latimer, that, in the first place, I have never found a chronic origin or cause in cases of pyorrhea alveolaris. Dr. Latimer is right in asserting that there is some systemic trouble. But what is it? In what class of patients do we find this trouble? Generally in patients of a nervous constitution. As far as I can trace it, and my friend, Dr. Waldstein, concurs with me, the primary cause is neurosis of the vasomotor system. This neurosis leaves the blood-vessels in a sluggish state, which detaches the gums from the necks of the teeth, and thus leaves room for salivary calculus to be deposited there and for food to get under the gums. Where there is neurosis of the vasomotor system there is necessarily relaxation of the blood-vessels, and you get inflammation very readily. A bristle from the tooth-brush, almost anything, will cause inflammation when there is such a condition. As to the incurability of the disease, I think most cases are curable, and yield readily to proper treatment. I have for six or seven years taken a great deal of interest in this disease; have treated many cases, and have cured, I should say, between seventy and ninety per cent. of them. The remedies I prefer to use locally are tartrate of chinoline and iodo-chloride of zinc, as I have said before in this society. I have had great success with them. but of late I have come to the conclusion that, in connection with these remedies, manipulation of the gums and electricity are of exceedingly great service; and of course in some instances constitutional treatment is absolutely necessary, and is advisable in all of them. Fresh air and good food, together with stimulants and other suitable medication as the case may need, are beneficial.

Dr. N. W. Kingsley. Dr. Bödecker has suggested a new remedy for pyorrhea alveolaris—fresh air. I had never thought of that before, but I think it is a good thing It reminds me of a gentleman forty years of age, who came before me for examination. It became necessary for me to ask him his idea as to the cause of irregularities in teeth. He said he thought it was bad ventilation. Now, if the want of fresh air will create irregularities in teeth, possibly plenty of fresh air will cure pyorrhea alveolaris. Dr. Latimer said he had not much hope of giving his patients any great benefit, and, as he also said he was using carbolic acid, I feel moved to say that I don't wonder, for the very worst thing I have tried in such cases is carbolic acid. Invariably under my hands it will aggravate the trouble. You will find more pus the next day after using it than you did the day you put it in. I do not intend to propose a cure for Riggs's disease. I don't know that I can cure it, but I certainly cannot cure it with carbolic acid. I know only this, that aromatic sulphuric acid acts a great deal better in my hands than carbolic acid.

Dr. Bödecker. I will make a correction. I did not mean to say that fresh air would cure alveolar pyorrhea, but that, in combination with such other remedies as are advisable, it is beneficial, if the general health of the patient has been down.

Dr. Rhein. In regard to the remedies that Dr. Bödecker spoke about, I would like to say a word or two. I saw the results of his treatment on one patient this summer,—a lady whom he had been treating for some time, for as aggravated a case of this disease as I had ever seen. He intrusted the patient to my care, and I followed up the treatment that he had been pursuing, and found that what he has said about those two remedies, the iodo-chloride of zinc and the tartrate of chinoline, is true, and that they accomplish all that he has said they would. The patient I spoke of was evidently suffering from considerable heart trouble, which I thought was the real cause of the alveolar pyorrhea. It would attack different teeth, but it instantly yielded to those remedies. It would yield to the remedies, and then reappear again after the treatment had been stopped. But the efficacy of those remedies was very clearly shown to me in this particular patient. The president asked, a few moments ago, how the tartrate of chinoline was applied. It comes in the shape of a white powder, and it is used very much in the same manner that Dr. Latimer uses his carbolic acid and glycerin. It must be introduced under the gum around the necks of the teeth. It can be used in a saturated solution, in water. The course pursued in the case of this patient was to use the iodo-chloride of zinc first, not more than once,—it is a very strong stimulant,—and then follow it up with the tartrate of chinoline on the succeeding day. It generally requires only one or two applications to stop all suppuration, but in this case it would break out again after some time, indicating very clearly that the disease originated in or was perpetuated by some constitutional trouble in the patient.

Dr. Meigs. I can add my testimony to what has been said in regard to the efficacy of those two remedies. The patient, twenty-eight years of age, was as fine a specimen of womanhood as I have ever seen. She lives in Schoharie, and has been accustomed to go home every year to see her family dentist, but for a year or two she had not been home. She had only one or two teeth filled. When she came to me her gums were all full of bloody pus. I tried Dr. Bödecker's treatment for very nearly three months, and I never in my life saw any one improve so rapidly as she did under this treatment. She was under the impression that the iodo-chloride of zinc made her feel a great deal better in a few hours after its application. She went home on a visit six or seven weeks ago, and I have not seen her since. I do not know that she is entirely well, but she was nearly so when she went away,

Dr. Bödecker. As Dr. Rhein has related something regarding the case of this lady, who spent the summer in Asbury Park, I beg to say that the case is not entirely cured. I have applied electricity two or three times, and the trouble yields wonderfully to it.

President Northrop. How do you use the preparation of iodo-chloride of zinc?

Dr. Bödecker. Take an ounce of water and add forty grains of the chloride of zinc, and mix the two together.

Dr. Odell. I would like to add a little testimony also. I saw the patient that Dr. Rhein referred to and that Dr. Bödecker has just spoken of, and I can testify to the most dreadful state of affairs in that mouth. I was strongly disposed to believe that perhaps Dr. Bödecker was not so smart as he thought he was, and that perhaps I could take that case and do with it just as I had done with hundreds of others; make a success of it, without using any chinoline or iodo-chloride of zinc, as he suggested. I propounded those views to Dr. Rhein. At one time I was fully satisfied that I could have taken, what Dr. Abbott considers the most efficacious, cold steel, properly shaped and properly handled, and cured the whole thing. One tooth in that case was very loose. It had a habit of getting loose on the most unexpected occasions, and I don't think cold steel would have been of the least use, only to extract it. Dr. Bödecker testifies that that tooth is all right; and all that has been brought about by pursuing the treatment he has described.

I had in Asbury Park two patients,—an Italian gentleman and his wife. He had all his thirty-two teeth, with only one filling,—a small amalgam filling. The other teeth are absolutely perfect, except some very little fissures, but so hard underneath that I had not the conscience to suggest doing anything but cleansing. But I could put my finger on the gum almost anywhere in that man's mouth and squeeze out pus around the necks of the teeth. His wife was in the same condition. It is perhaps ten weeks ago that I commenced work for them, and the gentleman to-day presents a gum as handsome as any you ever saw in a child's mouth. The margins are thin and hard. I could not wish for anything better, and the teeth are in a beautiful condition. It has cost him possibly forty-five dollars for his own mouth and his wife's, and to-day he is all right and she very nearly so.

Dr. Howe. I have felt very glad to-night to hear Dr. Latimer's statement of his belief in regard to the cause or origin of this trouble, because it coincides with the opinion I have held for a long time, that the causes are systemic and that the origin is constitutional. Dr. Bödecker follows it out a little more definitely, and undertakes to say just what it is. Of course, we shall have to wait and see how nearly accurate that diagnosis and pathology of the disease is. It certainly seems to be very reasonable. I have never myself come to any definite conclusion as to what it is, further than what was stated by Dr. Latimer, that it was constitutional in origin.

But what I wish to say principally is that my observation has not been the same as Dr. Latimer's in one respect, and I have less faith in his belief that I could pick out the cases of this disease by the looks of the patient. He said, as I understood him, that the patients were nearly all run down,—that they showed an appearance of exhaustion. My observation is that very many people in the full vigor of health are suffering from this disease. I have seen such—men and women—who were physically a great deal like the lady Dr. Meigs spoke of, who yet have suffered and are suffering from the ravages of this disease. Notwithstanding all that, I have believed for a long time that it was constitutional. I have seen it descend from grandfather to grandchild, taking in, in the intermediate steps, most members of the family. I had a lady in my chair yesterday who is a fine specimen of a woman physically, and probably about thirty years of age. Four months ago she came to me, and there was then no mark or sign of this disease, which Dr. Black has most wisely named phagedemic pericementitis. Yesterday the three upper molars on the right side were all of them seriously affected. The process is wasted, the gums congested, and I can pass a fine instrument up the buccal, the lingual, and the mesial surfaces at least three-quarters of the distance to the apex of the root. I did not find much tartar, either salivary or sanguine. I am very glad indeed to have heard the testimony in regard to these new remedies. I congratulate Dr. Bōdecker and all the rest of them on the new hope that is held out.

Before I sit down I would like to ask Dr. Bōdecker just what he means by teeth being "all right." I have treated a good many of these cases, and the best I have ever been able to do is to arrest the suppurative process, and cause the gums to assume a normal appearance—to be firm and rigid, and lie up close to the teeth and take hold of them to some extent. But I have never yet seen a case that I treated in which, after six months, I could not find points where I could insert a fine instrument and pass it up some distance, although not finding any pus. I did not find any adhesion of the gum to the tooth, and I could not say they were all right.

Dr. Bödecker. At the last clinic of this society, or the one before the last, I had a gentleman present whose teeth I treated about two years ago, and which were very loose from this disease. Dr. Atkinson, and probably several gentlemen in this room now, saw the condition of the gentleman's gums at the clinic, and that condition is what I call "all right,"—that is, when the gums are healthy, of good color, and perfectly grown around the necks of the teeth, which are firm. I do not believe that in every instance the lost alveolar process is restored; that is not possible every time, especially when the patient is advanced in age, as the patient was whom I presented at the clinic.

Dr. Hodson. I have never had much faith in myself in being able to compass this disease. I have always felt it to be a constitutional one, basing my belief largely upon the fact that it has run through families. I have had families in which sisters and brothers and fathers and mothers were attacked with the disease, and at about the same period of their lives. My treatment of it has been the most discouraging thing to me—perhaps the most disgusting—that I have ever had anything to do with. I have never felt that I was doing anything more than palliating the trouble. I do not think I have ever cured one case, although I have used all the remedies with the utmost care. I have never found much tartar on the teeth in these cases, and if I had I doubt very much if I would put my patients through a course of Riggs's treatment, which I consider very barbarous. I don't believe in going over a whole set of teeth to the ends of the roots. I think it hurts more than a set of teeth would be worth, although I would hang on to a tooth as long as any one. I am going to take up Dr. Bödecker's suggestion, and see if I cannot do better than I have been doing in the treatment of this disease. Heretofore my success has been,—well, not quite *nil*, perhaps, but so near it that it has been more discouraging than anything else I have met with in my practice.

Dr. Watkins. This subject was thoroughly discussed at Niagara Falls, several gentlemen giving their methods of treating the disease, and when they were all through Professor Frank Abbott described his method, which was the use of well adapted instruments by a well educated hand. The doctor thought that was perhaps the best treatment there was for such cases. That has been my treatment, with the addition of aromatic sulphuric acid, and I consider that I have been successful in a good many cases. I have had some failures, but in several cases I have had great success. I have never used anything in the way of medicine except aromatic sulphuric acid.

Dr. Rhein. I think the gentlemen on both sides of this case are correct in their treatment, for there are undoubtedly two classes of patients who present themselves to us, with symptoms exactly the same, only I think the class whose symptoms arise from constitutional trouble are the more aggravated of the two. I think they are much more rare than those which come from some mechanical irritant. We get loosening of teeth and exudation of pus around them from the action of salivary calculus wearing its way up their necks; but this salivary calculus only gets up on the root after inflammation has loosened the gum from the necks. Almost any irritant will cause this thing. I have seen some of the worst cases of this trouble come from an irritant, and yet there was no deposit of salivary calculus under the gum at all, the irritant in these cases being the tooth-crowns that are so commonly used at the present day, with gold bands inserted on the roots of another tooth. I saw one of the most aggravated cases of pyorrhea alveolaris at Asbury Park this summer, caused by the insertion of three teeth on a bridge-piece. The roots were all loosened, and pus was exuding from the gum. The cure for these cases is to remove the irritant and apply some local stimulant. The method advocated by Dr. Watkins is proper in proper cases, but we ought to use some judgment in this matter. Any one who has seen a case where the trouble is undoubtedly constitutional will easily recognize a similar case when it presents itself.

Dr. La Roche. About twenty-seven years ago a case of this kind came into my hands, the teeth being in a bad condition from deposits of tartar. I have followed Dr. Abbott's treatment in the case, and I have cleaned the teeth, on an average, twice a year for twenty-seven years, always as thoroughly as I could. I used nothing but the instruments in the case—no medicine except some of my tooth-powder, which is composed of chalk. The lady has all of her teeth to-day except two. I found tartar around the roots of the teeth, under the gums, a few months after cleaning them. I have at times seen this patient's gums and teeth look very well, and at other times there would be a very bad condition apparent. The lady is still living, and I saw her only a short time ago.

Dr. Bödecker. I will say that, in the course of several years' experience in the treatment of this disease, I have found that the more thoroughly I cleaned the teeth from the first sitting, the less successful I have been. The more you lacerate the gum in the first place, the more inflammation you will have, and the more pus in those cases which are less successful. Those cases which are extremely difficult to control generally require no scaling or taking away of tartar at all for the first two or three sittings. I merely try to get the gum in such a condition that I can work around the teeth without much irritation, and I aim to irritate the gum as little as I possibly can. Since I have pursued this practice I have saved more teeth than I did by the scaling process. You can create a great deal more inflammation by your scaling operation than already exists, and you will have a great deal more pus after it. In patients of better constitution a good cleaning may be beneficial, and in such cases probably I would do the same thing at the first sitting—but not in every case. One must exercise a discriminating judgment.

Dr. Hodson. It seems to me that there has been a misapprehension in the minds of most of the gentlemen who have spoken upon this subject, in mixing up half a dozen different diseases. I spoke only of chronic pyorrhea alveolaris; I did not speak at all of those conditions of legitimate abscess, about which perhaps Dr. Rhein spoke. This condition of which we are speaking is found upon live teeth, and upon a whole mouthful of teeth at once. I conceive it to be entirely constitutional, and without other abscess than I have spoken of. My local treatment has been almost wholly a very modest, reasonable, and careful cleaning, without going to the ends of the roots, but only as far as I can legitimately go in a kindly treatment, and the application of aromatic sulphuric acid. I have been looking for some one to give us a constitutional remedy, and I hope Dr. Bödecker has done that.

Dr. Watkins. One question: Is not this disease (pyorrhea alveolaris) almost entirely constitutional, and confined to persons who do not use their teeth, or use them but very little? Is it often seen in persons who are in the habit of using their teeth vigorously?

Dr. Bödecker. In reply to the question of Dr. Watkins, I would say that my reason for introducing this manipulation of the gum which I spoke of, and which I have found very beneficial, was that these people generally eat very soft food, using their teeth very little, and the softer food they eat the worse this trouble gets. I require all these patients to manipulate their gums night and morning, and I find it is extremely beneficial.

The society then adjourned.

James E. Dexter, M.D.S., *Secretary.*

Clinics.

Clinic held April 3, 1883.

Dr. W. Storer How, of Philadelphia, illustrated his method of setting artificial crowns, by setting a left superior central for a boy of about thirteen years. The tooth had been broken off by a blow, some three months previous, and Dr. How found the root so much softened and disorganized that it would not hold with sufficient firmness the screw for his artificial crown, and he was therefore obliged to abandon the operation until the root could be filled with amalgam. Dr. How described his method and the instruments he uses.*

Dr. S. C. G. Watkins. You first set the post in the root before you attach the crown?

Dr. How. Yes, sir.

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*See Dental Cosmos for April and May, 1883.

Dr. Watkins. Those pins show through the crown very plainly; it looks as though there was not very much strength there. What advantage do you claim over the Bonwill method?

Dr. How. The foundation is made secure, and the post is fixed in the root. The tooth is mounted on a fixed post, and does not move about during the process of backing.

Dr. Watkins. Can you back that up as solidly as we can the Bonwill, which is pushed home as solid as a rock?

Dr. How. I think so. The post has a hold independent of the amalgam.

Dr. Watkins. When the Bonwill crown is backed up with amalgam we have one solid mass, and it is nearly impossible for the pin to give or get loose in the root.

Dr. How. The experience of a great many people is that it does get loose, but I am not here to disparage the Bonwill crown. By my method this post is fixed securely, and at a definite depth; there is no guess-work about it. When it has been measured with the gauge one is certain of the case.

Dr. R. C. Brewster, of Brooklyn, filled an approximal and crown cavity in a left superior first molar, using No. 3 soft gold and the electric mallet. During the progress of the operation the battery failed, and the filling was completed with a hand-mallet. The cavity was large, and the tooth alive. No cement or plastic lining was used.

Clinic held May 1, 1883.

Dr. W. Storer How, of Philadelphia, inserted a left upper first bicuspid by his method of pivoting. The operation seemed to be a very nice one, although time only can prove its durability and value.

Dr. Watkins, of Mont Clair, N. J., presented a boy eleven years of age, who in January last broke the right upper central in two halves, transversely. On the day that it was broken Dr. Watkins capped the exposed pulp, using iodoform first, then laying a piece of gutta-percha softened in chloroform over the pulp, and finally filling the rest of the cavity with oxyphosphate of zinc. He cut a groove around the tooth in the boundary between the dentine and the enamel, and in this way the filling got a good hold. To-day the doctor took away the oxyphosphate filling, and the pulp was found to be in very good condition; in fact, there appeared to be a deposit of secondary dentine all around; but, not having seen the tooth when broken off, it cannot be very well determined whether there was really a deposit of secondary dentine, or whether the opening was as large as it was originally. Dr. Watkins says the opening in the pulp-chamber was originally a great deal larger. It was again dressed, filled with oxyphosphate, and the boy dismissed.

Dr. Starr exhibited the electric motor, to which he has added some improvements. Heretofore the battery necessarily consumed a great deal of electric fluid, and to-day he gave a very interesting hint as to how it might be economized. He found that the battery fluid, as it becomes deteriorated by use, sinks below the fresher unused portion. He, therefore, removes with a syringe the lower portion of the fluid, replacing with fresh only the deteriorated quantity. He also showed a revolving-fan attachment to the motor, which is driven from the same battery, and governed by a switchboard.

Clinic held June 5, 1883.

Dr. Rhein filled the anterior and approximal surfaces of a right superior central, using the electric mallet and No. 4 foil, folded to 24. The patient was a gentleman apparently about twenty-five years of age. The tooth had been previously filled with oxyphosphate, some of which was allowed to remain as a lining for the gold. Dr. Rhein commenced to excavate the cavity at twenty-five minutes past two, and completed the operation about half-past five. Dr. Rhein said: "The anterior approximal surface of the left superior lateral I have already filled with the hand-mallet and pellets. On the left superior central the anterior approximal, lingual, and posterior approximal surfaces I have contoured with the electric mallet, the whole forming a single entire filling. The pulps were not exposed, but were protected by oxyphosphate. The right lateral is also contoured in the same way with the electric mallet. To-day I am performing the same operation on the right superior central. All of the superior teeth are to be contoured in the same way. They are temporarily filled with oxyphosphate, which filling will form a lining for the gold to be introduced afterward."

Dr. Bödecker presented a case which he described as follows: "Mr. F., age over sixty, came to me with some of the lower teeth quite loose,—so much so that some of them could have been removed with the fingers. The teeth in position when the patient came into my hands were, on the right side, the first and second molars, the first bicuspid, the cuspid, and the lateral; on the left side of the lower jaw there were present the second and third molars, the first and second biscupids, and the cuspid. In the upper jaw were the six incisors in front, and the right upper bicuspids. All the molars had come out of the mouth without a sign of decay, becoming so loose that the patient removed most of them with his fingers. The treatment of this case has been as follows: I first thoroughly removed all the calcareous deposits; then made an application of iodo-chloride of zinc, forty grains to the ounce of water, applying it every other day for about a week, until I saw healthy reactions of the gums, which up to that time were much inflamed. Then I continued the treatment by using a concentrated solution of tartrate of chinoline—the saturated solution—in the following manner: Upon a nerve-plugger or broach, sufficiently stiff for the purpose, I wound a few fibers of cotton; dipped this into the solution to be applied, and thoroughly removed every trace of foreign matter present between the gum and the necks of the teeth. This treatment was continued every other day for about six weeks, when the teeth were in the condition presented to-day."

In the case described by Dr. Bödecker the teeth were all firm in the jaw; they had a long appearance, as though partly denuded to the gum, but were sound and firm. Dr. Bödecker also presented a young man, apparently about twenty years of age, with disease of the antrum, the opening from the nose to the antrum being closed. Dr. Atkinson examined the case and advised that the naso-antral opening be re-established by perforation.

Dr. E. Parmly Brown presented a set of heavy double-end chisels, of his own devising, which he said he had been five years perfecting. They were manufactured by the S. S. White Dental Manufacturing Co., from Dr. Brown's patterns. They are adapted for cutting away tooth-material and scaling. The blades are very thin and broad. Dr. Brown called them "Heroic Chisels."

Dr. Watkins presented the model of a mouth in which only the twelfth-year molars articulate, the jaws being held apart by them so that there was nearly half an inch space between the lower and the upper incisors.

Clinic held October 2, 1883.

Dr. Geo. S. Meigs presented a case of sensitive teeth, caused by their being worn down until the pulps were nearly visible through the dentine, although not quite exposed. The patient was a gentleman of about fifty years, who had lost but one tooth, and had one dead. The teeth were absolutely occluded all around, and it was impracticable to fill them. Dr. Meigs applied the galvanic cautery to some of these teeth, for the purpose of relieving their sensitiveness, by coagulating the albumen and causing the nerves to shrink and retire, without killing them. He applied the galvanic cautery at the clinic to the left inferior second molar, the left inferior second bicuspid, and the two superior cuspids. The teeth after the operation were not sensitive to cold. Dr. Meigs considers this the best treatment for this kind of trouble, and knows of only one other case so treated, which was by Dr. Bödecker.

Dr. W. E. Burk, representing the S. S. White Dental Manufacturing Co., exhibited the Verrier furnace for continuous-gum work. The furnace is heated with gas, and a continuous-gum case was fused in it in twenty-two minutes. Dr. Burk also exhibited an improved dental operating chair, called the "Cycloid."

VERMONT STATE DENTAL SOCIETY.

The eighth annual meeting of the Vermont State Dental Society was held in Welden Hall, St. Albans, Vermont, commencing March 19, 1884. The following officers were elected for the ensuing year:

R. M. Chase, president; G. H. Swift, first vice-president; R. W. Warner, second vice-president; Thomas Mound, secretary; Jas. Lewis, treasurer; W. H. Munsill, C. F. Lewis, and W. S. Curtis, executive committee.

The next meeting will be held in Burlington, the third Wednesday in March, 1885. T. Mound, *Secretary*,
Rutland, Vt.

NATIONAL DENTAL ASSOCIATION.

The National Dental Association of the United States of America will hold its next regular meeting in the Lecture-room of the United States National Museum (annex to the Smithsonian Institute), Washington, D. C., July 22, 1884, commencing at 11 o'clock A.M.

R. Finley Hunt, D.D.S., *Secretary*,
No. 418 Twelfth St., Washington, D. C.

ILLINOIS STATE DENTAL SOCIETY.

The twentieth annual meeting of the Illinois State Dental Society will be held in the Senate Chamber, Springfield, Ill., commencing Tuesday, May 13, 1884, and continuing four days.

The State Board of Dental Examiners will meet at the State House, on Monday (12th), at which time all candidates for examination must be present. J. W. Wassall, *Secretary*,
No. 103 State St., Chicago.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The sixteenth annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., on Wednesday and Thursday, May 14 and 15, 1884.

The Board of Censors will meet at the same place, on Tuesday, May 13, for the purpose of examining candidates for the degree of

M.D.S. For information in regard to the requirements of the board, address Dr. Frank French, Rochester, N. Y.

J. Edw. Line, *Secretary*, Rochester, N. Y.

SUSQUEHANNA DENTAL ASSOCIATION.

The thirty-sixth convention of the Susquehanna Dental Association will be held at the Broadway House, Milton, Pa., May 15 and 16, 1884.

Members of the profession are cordially invited to be present. Hotel rates, $2.00 per day.

L. Campbell, *Secretary*.
Slatington, Pa.

CONNECTICUT VALLEY DENTAL SOCIETY.

The semi-annual meeting of the Connecticut Valley Dental Society will be held at the Sea View House, Savin Rock, New Haven, Conn., on Wednesday and Thursday, June 18 and 19, 1884.

W. F. Andrews, *Secretary*, Springfield, Mass.

NORTH CAROLINA STATE DENTAL ASSOCIATION.

The North Carolina State Dental Association will hold its tenth annual meeting in Raleigh, beginning Tuesday, June 17, 1884, and lasting three days.

The State Board of Dental Examiners will meet at the same time and place. Members of the profession generally are cordially invited to attend. We expect an unusually large and interesting meeting.

T. M. Hunter, *Secretary*.
Fayetteville, N. C.

KANSAS STATE DENTAL ASSOCIATION.

The thirteenth annual meeting of the Kansas State Dental Association will be held at Hiawatha, Kansas, commencing on Tuesday, May 6, 1884. This meeting is held at the same time and place as the annual meeting of the Nebraska State Association, in accordance with the unanimous desire of the two associations for a joint meeting.

J. D. Patterson, *Secretary*,
800 Main St., Kansas City, Mo.

A NATIONAL DENTAL ASSOCIATION.

To the Presidents and Members of State Dental Associations:

Gentlemen:—The foremost men of our profession admit the fact that the name of American Dentistry has not that world-wide recognition which its honor demands and its history would warrant. In our opinion, this is an opportune time for a general movement to place it upon a basis commensurate with its dignity, and we venture to submit the outline of a plan for the purpose, which we think feasible, and hope will meet with your sanction and furtherance.

As a nation claiming to lead the world in the science and art of dentistry, we should have one great representative body of the profession to speak forth with authority its aims, duties, and attainments. Let us, therefore, organize a National Dental Association of the United States, composed of delegates elected by the various State organizations, an equal number from each State, to meet annually, and always at Washington, D. C. Thus we would give to Delaware the same voice as to New York. In order to always secure a full meeting, we would suggest six as the number of delegates from each State; a like number of alternates having been elected. Let the National Association elect a Board of Regents, one from each State, who shall control its meetings, setting the time, etc.

As important adjuncts to this association, we believe it would be found expedient to establish an extensive library, to contain dental works and publications, standard and periodical, foreign and native; and to found a national museum, to illustrate the past, present, and future of dentistry. The wonderful benefit to the profession and humanity in general to be derived from these is certainly manifest to every intelligent dentist. We are sure that room can be obtained in the Smithsonian Institute for the museum, and in the library of the Surgeon General's office for the library. We are equally sure that Congress will grant an appropriation for both purposes, as is done for the medical profession.

Mature deliberation at the meeting for organizing will suggest the details of the scheme, which we have not thought it necessary to go into here.

In conclusion, we would respectfully urge that you elect, at your next meeting, delegates, with alternates, to meet for the purpose of organization, at the time agreed upon by the chairmen of the different State delegations. Do this in anticipation of like action upon the part of other State societies; then forward to Dr. B. H. Catching, Atlanta, Ga., the name and address of your chairman, and he will act as medium of communication between the different delegations, informing each of the action of the other, thereby bringing about unity of action. Yours respectfully,

Frank Abbott, New York City.
J. E. Cravens, Indianapolis, Ind.
C. T. Stockwell, Springfield, Mass.
F. Searle, Springfield, Mass.
W. C. Wardlaw, Augusta, Ga.
B. H. Catching, Atlanta, Ga.

BOSTON DENTAL COLLEGE.

The sixteenth annual commencement of the Boston Dental College was held at Memorial Hall, Boston, Mass., on Wednesday, April 2, 1884, at 7.30 P.M.

The annual address was delivered by Prof. Albert N. Blodgett, M.D., and the valedictory by John F. Allen, D.D.S.

The number of students for the session was as follows: Juniors, 40; seniors, 21; total, 61.

The degree of D.D.S. was conferred on the following graduates by Professor I. J. Wetherbee, D.D.S., president of the college:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
John Foster Allen	Massachusetts.	John Kennedy	Massachusetts.
Walter I. Brigham	Connecticut.	Charles Asa Maynard	Massachusetts.
Harry S. Draper	Massachusetts.	Charles A. Magoon	Massachusetts.
Lewis More Edes	Maine.	Edward A. Perrin	Massachusetts.
Lemuel W. Fowler	Nova Scotia.	Thomas J. Springall	Massachusetts.
Sydney G. Hahn	Massachusetts.	Chas. E. Willoughby	Massachusetts.
Clarence Orvin Hood	Massachusetts.	Frederick H. Young	Saxony.
Elmer E. House	New Hampshire.	Joshua Edson Young	Maine.

UNIVERSITY OF MICHIGAN—DENTAL DEPARTMENT.

The ninth annual commencement of the Dental Department of the University of Michigan was held at University Hall, Ann Arbor, Mich., on Friday, March 28, 1884.

The commencement address was delivered by Hon. Thomas M. Cooley.

The number of matriculates for the session was sixty-seven.

The degree of D.D.S. was conferred on the following graduates by James B. Angell, LL.D., president of the university:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Thomas Allen	Michigan.	Louis Manning James	Michigan.
Rowland Wm. Bailey	Illinois.	Joel Dart Jones	Wisconsin.
Francis E. Battershell	Ohio.	Ezra Lincoln Kern	Ohio.
Coldwell Corydon Beebe	Wisconsin.	Donald Douglas Magill	Pennsylvania.
Franklin R. Carson	Illinois.	Louis James Mitchell	Ohio.
William Cleland	Michigan.	Minnie Ferris Mosher	Michigan.
C. Maclean Cunningham	England.	George Eddy Sanders	Michigan.
Lyndall Llewllyn Davis	Michigan.	Frank Germain Seger	Michigan.
Levi Calvin Dozer	Ohio.	John James Taylor	England.
Louis Robert Esau	Wisconsin.	Francis W. Temple	Michigan.
Clarence James Hand	Texas.	Chas. Phillip Weinrich	Illinois.
Edson L. Hutchinson	Michigan.	James E. Winans	Pennsylvania.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

The sixteenth annual examination of the Royal College of Dental Surgeons of Ontario, Canada, was held in the City of Toronto, March 4 to 7, 1884.

No formal commencement exercises are held.

The number of students in attendance during the session was twenty-three.

Thirteen students passed the primary examination.

The following passed the final examination and received the title of L.D.S. and license to practice dentistry in Ontario, viz.:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Geo. Ball	Brussels.	Fred. Killiner	St. Catherines.
S. E. Catherall	Brockville.	C. B. Mansell	Almonte.
Fred. Denne	Newmarket.	M. McLaren	London.
F. Hansel	Toronto.	C. W. Parker	Guelph.
A. Husband	Newton Brook.	G. V. Snelgrove	Toronto.

EDITORIAL.

REVIVAL OF A DENTAL JOURNAL.

The *Missouri Dental Journal* had barely suspended publication when its successor, *The Archives of Dentistry*, made its appearance. A number of dentists, organized under the name of the Dental Journal Association, purchased the former journal and revived it with the new title given above. It proposes to devote itself to "subjects relating to dental science and art, and also those of related sciences." The January number was issued a month or more behind time, but notice was given that "future numbers will succeed each other at intervals of less than a month, until the regular issues are up to time, after which the journal will appear on the first of each month." It is intended to publish it simultaneously at Chicago, Ill.; St. Louis, Mo.; and Atlanta, Ga. Its projectors may be reached through J. H. Chambers & Co., publishers, No. 405 North Third Street, St. Louis, Mo. We can but wish it success.

BARTHOLDI'S STATUE OF LIBERTY.

We have received, through the courtesy of the Travelers' Insurance Company, of Hartford, Conn., a copy of the superb official lithographic picture of Bartholdi's colossal statue of "Liberty Enlightening the World," the pedestal for which is now in course of construction in New York Harbor. It is the intention of the Pedestal Committee, of which Wm. M. Evarts, Esq., is chairman, that the statue shall be erected in its commanding position in the course of the next year.

PERSONAL.

John D. Maynard, M.D.S., son of Dr. Edward Maynard, of Washington, D. C., on and after May 1, 1884, will be associated with Dr. John W. Crane, at No. 41 Boulevard des Capucines, Paris, France.

PERISCOPE.

On the Relations Between Dental Lesions and Diseases of the Eye.—The connection between dental disease and affections of the eye is not at first sight very apparent, but it has been noticed, though for the most part casually, by many writers. * * * I presume that you will all accept as a fact that which is admitted by all ophthalmic surgeons, that there is such an affection as reflex or sympathetic ophthalmia—that is to say, that irritation of one set of branches of the fifth nerve will affect those of the opposite side. If any ophthalmic surgeon be asked why he believes in reflex irritation of the globe and its appendages, his mind at once reverts to many cases in which injury to one eye, especially of the ciliary region, has been followed, after a period of very variable duration, by inflammation of the uninjured eye of a low but steadily progressive type, generally involving all the tissues, and leading to more or less serious impairment, or even to complete loss, of vision. If the question be put, How does the irritation or inflammation of one eye come to affect the other—by what path, or paths, does the irritation travel?—the reply given, both by exact clinical observation and by pathological investigation, is that in the vast majority of cases there is a neuritis which travels along the ciliary nerves, but in a few instances along the optic nerves, and we shall see that this conduction of the morbid process along the sheaths of the nerve is of considerable importance in enabling some explanation to be given of the occurrence of reflex troubles where the teeth are the seat of primary lesions. Injuries affecting the branches of the first division of the fifth pair are well known to affect the eye of the same side, and there are good reasons also for believing that affections of other branches of the fifth pair of nerves may be the cause of ophthalmic troubles. * * *

In 1870 M. Delestre published an essay on accidents following extraction of the teeth, and reports several cases which tend to prove the existence of visual troubles. He remarks that odontalgia is often accompanied with weeping and redness of the conjunctiva, with sudden darts of pain, and winking of the lids. He considers that there is at first irritation of the branch of the dental nerve supplying the affected tooth, and which is, therefore, one of the branches of the superior or of the inferior maxillary nerve. This irritation of one part of the fifth extends to other parts of the fifth, and particularly to the ophthalmic, which leads to lachrymation and redness of the conjunctiva. * * *

One of the commonest forms of visual disturbance, induced by dental disease, is *loss or failure of the power of accommodation.* By power of accommodation is meant the faculty which the eye possesses of adjusting its refraction so that well-defined images of objects situated at different distances from the eye may be formed upon the retina. This is accomplished, as is now well known, by the action of the ciliary muscle, which, by contracting, causes the lens to become thicker.

The influence of dental lesions on the accommodation has been particularly investigated by Dr. Hermann Schmidt, of Berlin. This observer examined the eyes of ninety-two patients, who presented themselves at his clinic, suffering from some form of dental disease —such, for example, as caries, periostitis, or neuralgia. Considerable pains were taken to determine the range of accommodation in both eyes, and to compare that on the sound with that on the unsound side; whilst reference was made to the tables of averages for each eye given by Donders. Amongst the ninety-two cases Schmidt found there were only nineteen cases in which the range of accommodation was normal, or better than normal; in the remaining seventy-three cases the range was lowered, and in most instances considerably reduced. In unilateral odontalgia the range of accommodation was reduced on the same side in thirty cases. In fifty-one cases there was no difference in the diminution of the range of accommodation perceptible. In one case the eye of the side opposite to the unsound teeth was the weaker of the two. In nine cases the teeth were carious on both sides. It appeared further that the influence of dental lesions on the accommodation was more frequent the younger the patient, the ages between ten and twenty being those in which the paresis was most marked. After thirty years of age the impairment of the power of accommodation was much less frequently observed. In regard to the locality of the dental lesion, in forty-one cases in which the upper maxilla was affected, paresis of accommodation was observed seventeen times. In thirty-nine cases in which the lower jaw was affected, the paresis was observed nineteen times. Disease of the teeth of the *lower* jaw, therefore, appeared to be somewhat more effective in producing failure of accommodation than that of the upper. The nature of the dental lesion appeared to be of little importance, great impairment of accommodation accompanying comparatively slight disease, whilst extensive disease of the teeth, accompanied by severe pain, was associated in some instances with only slight paresis of accommodation. The explanation of this remarkable effect of dental lesion is not quite clear. Two views may, it appears to me, be taken of it. We may regard it as a reflex character, and as being analogous to that weakness or paralysis of infancy, and which we may consider to be the nature of an inhibitory influence, since they rapidly supervene and rapidly vanish; or we may regard it as a simple result of the generally lowered tone of the system, consequent on the depressing inflence exerted on the nervo-muscular and circulatory system by prolonged toothache. There can be little doubt that the sympathetic nervous system and the unstriated muscles participate in this depression; and we can easily understand how there is a corresponding diminution in the power of the ciliary muscle, and failure of accommodation. Schmidt himself advances a very different explanation. He believes that in these cases a reflex stimulation of the vasomotor nerves takes place, leading to increased intraocular pressure, and consequently to impairment of the power of accommodation. But when Schmidt's paper was written the action of the vasomotor nerves was less known than at present; and such reflex stimulation would seem calculated to lead to a diminution, rather than to an increase, of intraocular tension.

Another class of cases in which a reflex influence appears to be exerted upon muscular tissue is that in which the muscular tissue of the iris is affected. This condition is termed *iridoplegia*, or *mydriasis.* In it the pupil is widely dilated and motionless, owing, as is generally believed, to paralysis of the sphincter pupillæ, which is supplied by the ciliary nerves containing branches of the third nerve; but it is possible that it may be due to contraction of the dilatator iridis, if such a muscle really exists, and this might be produced either by irritation of the branches of the sympathetic or of the fifth pair, which Bilogh believes supply it.* It is remarkable and suggestive of its mode of origin that mydriasis rarely, if ever, occurs simultaneously on both sides, and in many cases that I have seen in past years I have scarcely ever been able to trace the etiology, though I must admit that I have not paid special attention to the teeth. It is instructive to find that, in one case recorded by Desmarres, a cure was effected by the extraction of a carious molar, and in future I shall certainly, in any case of the kind that may present itself, make a careful examination of the teeth.

One case, and, so far as I know, one case only, of *oxophthalmia* has been placed on record. It is contained in a recent number of the *Recueil d'Ophthalmologie* of Galezowski, p. 441, and is reported by Weinberg. * * *

That strabismus may be induced by dentition, and especially by difficult dentition, is, I think, generally admitted. Travers, as long ago as 1824, wrote: "Strabismus is also a sympton of irritation arising from difficult dentition." Yet the opinion that dentition is a cause of strabismus seems to rest on a general consensus of opinion only, rather than upon any special well-authenticated cases, and the frequency with which it is referred to in recent books is much less than was formerly customary; in fact, in some of the more recent treatises in Germany and France it is not even mentioned. This is attributable to the important generalization of the etiology of strabismus made by Donders, that in by far the greater number of cases it is due to hypermetropia.

Other striated muscles that have been noticed as being occasionally affected in a reflex manner by disease of the teeth have been the levator palpebræ and the orbicularis palpebrarum; the former supplied by the third nerve, and the latter by the seventh; the paralysis or paresis of the former leading to more or less expressed *ptosis*, the latter to *lagophthalmos.* Ely† has recorded three good cases of such affections, in one of which there was peresis of the orbicularis palpebrarum, with irregular spasms of the ciliary muscle and monocular diplopia. In another there was paresis of the rectus internus and ciliary muscles, and in a third case partial paresis of the third nerve.

An affection that is not unfrequently observed is that which is termed *blepharospasm*, or incessant winking of the lids, the movement being sometimes limited to the orbicularis palpebrarum, but at others extending to other muscles, such as the zygomatici and levatores anguli oris. This affection is well known to be associated with the error of refraction known as hypermetropia, when a powerful effort of contraction of the ciliary muscle is demanded. The impulse emanating from the brain, instead of being limited to the nerve supplying the ciliary muscle, has a strong tendency to radiate through other channels, and consequently to affect other muscles; while in some instances the secreto-motory fibers of the fifth nerve are excited, and a copious discharge of tears results.

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* Wecker, i., 407.

† New York Med. Record, Nov. 11.

But that similar conditions may be established in a reflex manner by some lesion of other nerves is well known by a case that was reported many years ago, by Von Gräfe, to the Medical Society of Berlin. In this instance the blepharospasm ceased almost instantaneously when pressure was made upon a point situated below the alveolus of the third inferior molar. At this point an incision was made down to the bone, but without modifying the blepharospasm in any appreciable degree. But having then established the fact that compression of the sub-orbital nerve and of the temporal branch of the malar materially diminished the spasm, section of these nerves was performed. The spasm immediately ceased, and the case was thought to be cured; but it reappeared at the expiration of a fortnight. The section of the inferior dental nerve, performed within the month, ultimately caused the blepharospasm to cease entirely, and it had not appeared four weeks after. A case of convulsive tic, as he terms it, has also been recorded by Mitchell, which, supervening spontaneously, was propagated to the muscles of the neck and arms, and which entirely disappeared after the removal of several teeth.

As additional evidence of the influence of the stimulation of other and distant parts of the nervous system on the orbicularis may be mentioned the observations of Claude Bernard; for this experimenter found that section of the sympathetic is followed by partial closure of the lids, and inversely if blepharospasm is induced in an animal by irritating the cornea with some caustic substance, it may be removed by galvanizing the sympathetic in the neck, when the lids open immediately, as if by magic. * * *

From the consideration of the influence of carious and painful teeth upon the striated and unstriated muscular tissue of the eye, I pass to that which they may be supposed to exert upon the conjunctiva, cornea, and sclerotic. And I would refer, in the first instance, to the affection named phlyctenular ophthalmia, which is very frequently associated with carious teeth, and which I believe to be often caused by them.

Phlyctenular ophthalmia consists in the appearance of one or more small vesicles, soon bursting and forming ulcers around the margin of the cornea, or on the surface of the cornea, or of the sclerotic. Sometimes only one is formed; at others a succession appears. They sometimes produce little or no uneasiness; at others they are attended with great intolerance of light, and abundant lachrymation. The child—for the disease occurs more frequently in children—keeps in the dark during the day, and only becomes lively at night. The pathology of this disease is tolerably well known. It is believed to result from an inflammatory process, attended with the proliferation of nuclei along the sheaths of the nerve. The nuclei gradually advance towards the surface along the conjunctival, corneal, and sclerotic branches of the fifth nerve, and accumulating on the surface, form, with a little fluid, the contents of the vesicle, and when the vesicle bursts they gradually break down and disappear. Now, in cases of phlyctenular disease I have been accustomed to give minute directions in regard to diet, believing that this affection owed its origin to reflex irritation of the nerves of the eye, consequent upon some disturbance of the stomach and intestinal canal; and to the mothers of the numerous little patients suffering from this affection, in our ophthalmic hospitals and departments of hospitals, I have been accustomed, after ordering a brisk purge and some quinine, to say, "Attend to its diet; no sweets, no pastry, no raw fruit. Give it bread and milk, finely-cut-up meat and potatoes," and I am perfectly satisfied with the result of that treatment; but it has occurred to me that the view I have hitherto entertained of the etiology of the disease may be perhaps erroneous, and that, instead of the stomach, the teeth are perhaps the organs at fault. It is easy to comprehend that the mastication of raw apples, candied lemon and orange peel, jams, tarts, and the like, lead to impaction of acid and fermentable substances in the cracks and crannies of the teeth, especially if these are carious, and that remaining there for hours or days, if the due cleansing of the mouth after foods is neglected, such particles may set up inflammatory troubles which may propagate themselves along the nerve and lead to what we term reflex phlyctenular inflammation of the eye. No doubt there are many exceptions to the rule that carious teeth and phlyctenula of the conjunctiva are associated, but I have noticed that a large proportion of the children who have phlyctenular ophthalmia have also carious teeth. Surely this is very suggestive of the etiology of the affection.

The occurrence of inflammation of the conjunctiva in such cases as the foregoing, as Weinberg remarks, may be explained on two theories: On the one hand, when any organ is under the influence of some stimulus, this influence may modify the nerve filaments which terminate in this organ, and thus occasion phenomena of a reflex nature, either in the eye or elsewhere. But it may also happen that the irritative process itself, whatever that may be, may propagate itself until it reaches the filaments which excite the neighborhood organ. It is evident that this can only happen when the filaments supplying the affected organs are derived from the same nerve, or when there are anastomoses between two nerves distributed to different organs. The two kinds of propagation, he observes, are well exemplified in the case of a carious tooth. In one instance there shall be well-marked conjunctivitis which resists ordinary treatment. The mouth is examined and a carious tooth is found, the very existence of which is unknown or forgotten by the patient, so slight has been the inconvenience he has experienced from its presence. The tooth is extracted, and the conjunctivitis forthwith and spontaneously disappears. This is a case of purely reflex action. But other cases are met with in which odontalgia is present, and in which the redness of the conjunctiva is accompanied with the small phlyctenular ulcers to which attention has just been drawn, with chemosis, and some impairment of vision. The pathogeny of this affection is more complex; part of the symptoms are here due to reflex irritation, but part also to an extension of the dental neuritis to the ophthalmic branch. In the course of nine months' out-patient practice, Weinberg believes he met with 188 cases of ocular disease dependent on dental lesion.

I have some reason for believing that serious lesions of the cornea may be primarily due to carious teeth, and I will venture to give you the heads of a case that I watched with much interest, but which ended disastrously so far as the eye was concerned. * * * The lesion of the cornea in such a case as this may be referred to its anesthetic condition; but the question arises, What caused the anesthesia? and I can suggest no cause for it except that her teeth were seriously affected.

I now proceed to the consideration of the last class of cases into which I divided the ocular troubles caused by dental lesions, namely, those in which the reflex action is exerted upon the optic nerve and retina and intraocular structures. And first in regard to the occurrence of *amaurosis;* the most brilliant case on record is one that is now of somewhat ancient date, having been given by Sir William Lawrence. * * * A similar case, in which an amaurotic condition of the eyes was improved by the removal of the stopping from a carious tooth, and was subsequently entirely cured by the removal of the tooth, has been reported by Dr. M. F. De Witt. * * *

The relations of the teeth to glaucoma have been considered by several writers, but especially by Hermann Schmidt (*Archiv. f. Ophthal.*, xix., i., 107), and by Priestly Smith ("Glaucoma: its Causes," etc., 1879, p. 10, *et seq.*), whose remarks upon the subject are very sensible. Glaucoma is a condition of the eye in which the humors of the eye are secreted in larger quantity than they can be taken up by the absorbents. The tension of the eye is therefore increased; it becomes hard and exquisitely tender, then extremely painful; the vessels of the retina are often seen to pulsate, and finally, after a period of suffering of variable duration, it quiets down, but the disc remains cupped, and the vision is altogether lost, or permanently and seriously impaired. * * *

The writing of this paper has recalled to my memory various cases which were in the highest degree suggestive of the teeth being the starting point of the trouble, and to which I regret extremely I did not direct a larger amount of care and attention at a period when it might have proved of service. * * * If a similar case appeared before me now, instead of trying iridectomy—which was here a signal failure, even when performed by two different operators, and which resisted eserine, and all the usual methods of reducing tension—I should at once have every tooth carefully and thoroughly inspected by an experienced dental surgeon. And I would ask whether such a case is not adapted for the removal and replantation of teeth, if these, after extraction, were found to be sound.

In conclusion, then, I think it may be laid down as a maxim to be generally observed, that in all cases of threatening glaucoma, especially when this is associated with ciliary neurosis and obscure pains in the temples and maxillary orbital regions—in all cases of mydriasis, and probably of myosis, originating without apparent causes—in all cases of sudden paralysis of either of the orbital muscles, or of loss of sensation in the absence of cerebral symptoms—in all cases of phlyctenular disease of the conjunctiva—in all cases of ulcers of the cornea resisting ordinary treatment—in all cases of sudden failure of accommodation, especially in young children—and, finally, in cases of exophthalmia, the condition of the teeth should at least be examined, and if faulty conditions present themselves these should be at once rectified, and then one at least of the possible causes of each of these diseases will be removed.—*Abstract of a paper by Henry Power, M.B., Lond., F.R.C.S., in the Medical Press.*

The Relation of Chronic Catarrhal States with Imperfect Development of other Tissues.—Chronic catarrhal states in childhood are invariably associated with other effects of mal-nutrition. While this is not a novel statement, it is at least one which has been imperfectly formulated. Such effects should not be dismissed as being simply those of scrofula and rickets, but should be exactly referred, as far as it is possible so to do, to the laws of development. Many conditions are present in patients who suffer from catarrh which may be called errors in development. It is true these errors are not of the kind denominated "variation" or "anomaly," but are pathological, and may be regarded as the results of precocity or retardation occurring in rapidly growing tissues. They are conspicuous in bone-tissue, tooth-tissues, skin-tissues, lymphatic tissue, and in nerve-tissue.

From the earliest period in development to the last, viz., at the twenty-first year, disease will modify structural processes much more readily and profoundly than at any subsequent period. The tissues may be said to be more plastic during the formative period and to retain the impress of morbid action a longer time than in the adult, and to carry into the future the results of this impress in altered relation or proportion of the formed elements. It is not intended in this place to show that chronic nasal catarrh is in any respect peculiar in this regard, but to invite attention to the operation of such forces which appear to have escaped detection.

The period of childhood is marked by changes as great in the proportions of the parts of the head and face as in any other of the body. The growth of the brain and the development of the permanent teeth are among the more striking of these. Clinical writers lay great stress upon the influence exerted on the economy, by the errors of cerebral and dental growths. Are the influences they exert in the etiology or in the maintenance of nasal catarrh to be ignored?

The condition of the development of the brain in connection with those of the nasal chambers, while one of great interest, presents difficulties for the investigator, since the examination of large numbers of examples would be required before conclusions worthy of credence could be reached. Ophthalmologists have, indeed, noted that the accelerated rates of development of the brain exist with a disposition to myopia. If such be the case, it is rational to conclude that the shapes of the nasal chambers will be in correlation with the states of the olfactory nerves, and thus the influence which exists between the brain and the eye will be found also to exist between the brain and the nose. The extent to which chronic nasal catarrh may be found among myopes cannot be formulated.

There is no doubt that the patients are as a rule in an unnatural mental condition. The mind is either precocious or dull; the temper is irritable and the disposition intractable; digestion is delicate, and reflex disturbances arising therefrom are of frequent occurrence. The patients belong to the class of subjects that develop morbid appetites, and, in girls, yield the predisposing causes which create so much disturbance at the approach of puberty. Chorea is occasionally noticed as a complication. In one example, a child of precocious intelligence, of delicate constitution, and who had nearly perished during an attack of acute pleurisy, the habit of exhaling air from the nostril was acquired after all symptoms of catarrh had ceased.

From the fact that with chronic nasal catarrh errors of development of the teeth and rates of growth and nutrition of the nails are often associated, it is convenient to examine the relations between the nails, the teeth, and other structures. By way of introduction to this topic, it can be said that in pathology the connection between the hair, the nails, and the teeth are numerous.*

Abnormal development of the teeth occurs in congenital hypertrichosis. Hair and teeth are commonly found in dermoid cysts. In man and in ruminants hairy warts are found upon the cornea. In congenital syphilis the cornea, the teeth, and the nails are all liable to peculiar inflammatory invasions. Is it not more than a surmise that, since all these structures—the hair, nails, enamel-organs, and cornea—arise from the *epiblast*, and are strictly tegumental in nature, they may be found affected together? Be this as it may, the nails and the teeth are certainly to be considered together in studying chronic nasal catarrh in children,—the nails at all times and the teeth during the formative period of the enamel-organs.

Through the courtesy of Dr. J. Wilkes O'Neill, the attending physician to the Southern Home for Destitute Children, I have recently examined 96 children, with the object in view of determining to what degree a connection could be traced between the teeth and the nails in individuals, many of whom, if not all, were known to have been subjected to neglect and to the various inherited effects which could reasonably be accepted as tending to retard development.

Of the entire ninety-six, fifteen children had white spots on the finger-nails in abundance; five of these had decided defective dental development,—that is to say, excessively chalky enamel, distorted and disfigured crowns, etc.; three had moderately chalky crowns, but no distortion; seven had no appreciable defects.

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* From the fact that the writer's biological and clinical studies have been pursued conjointly, he trusts that it may be thought admissible to introduce at this place some reflections concerning the nails and the teeth. These structures are of co-relative value in mammals generally. Blunt, flat teeth are always associated with hoofed digits, and sharp, conical teeth with clawed digits. Adopting the methods of the evolutionists, it may be assumed that the same forces which have been operative in changing the form, of teeth are also operative in changing the forms of the hoofs and claws. This co-relation is not found in the earliest of the mammalia. In the process of evolution of the quadrupeds as they exist about us, from the few generalized types known to have flourished in the past, it can be inferred that the impress upon the nutritive processes which would affect the forms of the teeth would also impress the entire tegumental series of the organism; not only the teeth and the nails would be in common affected by common causes, but the hair as well. Confining these remarks, however, to the nails and teeth, it is probable that the changes of food-supply necessitating corresponding changes in habit would most probably affect the claws and hoofs sooner than the teeth, since the latter are more resisting, and at least in many genera are completely formed, while the claws and hoofs are of continuous growth, and would be more readily influenced by changes in the surroundings.

No defective teeth were found in the remaining eighty-one children, so that the existence of dental defect exactly correlated with the spotted finger-nails. Of the fifteen children thus selected, a little less than half the entire number had spotted nails but no dental defect. No attempt was made to ascertain any defect of rate of eruption, for the data obtained from the inmates of an asylum for destitute children would be unreliable. It is quite likely that the numbers of defects of teeth would be increased rather than diminished by more careful examinations, made by dentists or other persons accustomed to detect minute abnormalities. Concerning the defective teeth and nails, it is conceded that they may have arisen from acute illness, as in the exanthemata, or from gingival inflammation, as in congenital syphilis. The "measles-tooth" was found in but a single individual, whose case was not enumerated. For the rest, it is quite possible some of the appearances may have been due to syphilis, though the pegged tooth was found in a single instance only. No account was taken of the occurrence of catarrh in the inmates, for although it is probable the conditions existed, it was not reported as present by the attendants. The disease is rarely recognized among the children of the poor, where the symptoms are not likely to receive attention.

From a careful study of nine patients from the writer's practice, it was found that five exhibited white spots on the nails of the hand and defects in the form and irregularity of rates of eruption of the teeth. In a young lady, aged fifteen, who came under care for this phase of catarrh, the superior lateral incisors had never been erupted, while the left deciduous superior canine tooth had remained in the arch. In a second case of a girl, fifteen years of age, who had been much neglected, the depression remaining upon the vertex (answering to the anterior fontanelle) was conspicuous, the teeth were irregular, the vault of the hard palate high and narrow, the disposition shrinking and irritable, and the mental faculties dull. In such patients the epiphyses of the bones will be seen to be too large for the shafts, particularly in the case of the radius as it enters into the composition of the wrist-joint. At the same time, the finger-nails are often marked by large white spots, and the teeth with milky opacities of the enamel.

The bones being slow in growth, the function of manufacture of blood-corpuscles is largely withheld from the medulla and retained for a longer period than is natural in the blood-vessel glands, notably the thyroid body, the tonsils, and the lymphatic glands. Hence a disposition exists for these structures to undergo hypertrophy. If this method of reasoning be accepted, it is evident that the presence of enlarged tonsils need not be regarded as a primary cause of the condition above outlined, though doubtless they may aid in a secondary manner in maintaining morbid determination of blood about the head, and if they are sufficiently bulky to cause obstruction in respiration while the mouth is closed, will in themselves create a class of disturbances peculiarly their own. All that is to be emphasized in this connection is the fact that the causes of tonsil-enlargement are due to nutritive conditions which are part of the history of the lime-selecting and the blood-making tissues everywhere in the body.—*Extract from a paper on "Chronic Nasal Catarrh in Children," by Harrison Allen, M.D., read before the College of Physicians of Philadelphia.*

Deformity of Upper Jaw and Adenoid Growths of Pharynx.—At the twelfth session of the French Association for the Advancement of Science, held at Rouen, M. David, of Paris, read a paper in which he maintained that adenoid vegetations, which are so frequently developed in the naso-pharyngeal cavity of the infant, reveal themselves externally by a peculiar aspect of the face. This modification of the physiognomy consists essentially in a deformity of the superior maxillary bone. The buccal portion of this bone becomes flattened transversely, so that the dental arch does not keep its natural shape and dimensions; and the hard palate becomes high and narrow. Irregularity of the teeth follows, because they do not alter, but the space for their accommodation is lessened. For the most part they tend to project in a mass forwards, so that the lower lip may be partially hidden by the front upper teeth. This special conformation of the palatal arch has hitherto received different interpretations. An ethnological signification has been accorded it. Some regard it as a sign of superiority, others of inferiority, of race.—*The Lancet.*

HINTS AND QUERIES.

Will some one be kind enough to inform me, through the Dental Cosmos, how they produce a high polish on amalgam fillings—even on a small filling in the serrations on the coronal surface, as well as a large filling, or part of a crown restored?—J. F. H.

Early Loss of Teeth.—I have a patient whose age is fifteen years. His superior incisors and molars are all gone, except the extremities of the roots. The cuspids and bicuspids are very badly decayed, and are very soft. The inferior molars and bicuspids are gone. With the exception of the above, the boy is in good health and always has been. What is it best to do?—T. W. E.

I have a most obstinate case of morbid growth of the gums, and have followed the treatment advised in Harris's "Principles and Practice"—both local and general—with little or no success. The patient is a lad of fourteen years, and seems unable to bear frequent lancing of the gums. Will some one who has had experience in this disease kindly advise me as to their treatment of it? The patient has no taint of syphilis.—A. J. B.

The Cause of Failure in Bridge-Work.—Much has been said and written upon that overestimated method of inserting partial artificial dentures known as bridge-work. Theoretically it is beautiful to contemplate, but practically it is a failure, the reason for which I will endeavor to show.

Theoretically these partial dentures are retained in position by means of water-tight bands or caps fitted to teeth, or the remains thereof, and these are united by a band or bar, to which the artificial teeth are soldered. This looks well upon paper, and also upon the plaster cast to which the appliance has been fitted, but the theory fails when put to the practical test of adjustment and subsequent wear.

The first difficulty to contend with is in the fact that the teeth to be capped, and which occupy the extremes of the space to be bridged, do not stand in parallel perpendicular lines, but in varying angles to the line of the gum. Now, to force the caps over these teeth and expect a water-tight fit afterward is to expect an impossibility. The final adjustment proves the fallacy of the theory, and the supposed nicely-fitting caps are distorted, leaving spaces greater or less, according to the angular position of the teeth, in which are all the required elements for rapid decay and the odoriferous indications which go with it. The patient is unable to remove the denture for the required cleansing, and both he and those with whom he is brought in contact are constantly reminded of the "skill" of the dentist who constructed the beautiful work of art. In the course of time the slight movement of the denture in mastication, aided by progressive decay, will loosen the objectionable appendage so that it drops out or is easily removed, and the discovery is made that two or more previously good teeth, which might have resisted the slightly hurtful action of removable clasps for years, are ruined beyond hope.

To test the correctness of my theory as to the non-fit of the caps, try the experiment of uniting two pieces of wood by the aid of dowel-pins which have been set at varying angles, and see how poor a fit one or both of them will make in its socket before the surfaces of the wood can be brought in contact.

I see that a patent has been granted for a process which will somewhat obviate these objections, by cutting off good natural teeth and substituting artificial crowns; and when this is done, the teeth, or that portion of them which is removed, will not be subjected to the unfavorable conditions previously stated. This is open to the slight objection (as it would seem in the eyes of the patentee) of disturbance of a good natural condition in order to perfect his method. This practice of destroying the normal condition of two good, healthy teeth for the purpose of holding in the mouth as many or even a few more artificial ones for a short time should be condemned in the strongest terms.

Now, as to the cleanliness of that part of the work which may be called the bridge proper, it is claimed by the advocates of this system that in this respect it is a success. The falsity of this statement is known to all who have had the experience of soldering a gold plate which has been worn even for a short time and has had the advantage of being cleansed while out of the mouth by a liberal application of soap and warm water. The recollection of the oil and grease eliminated from this apparently clean appliance, while boiling it in a solution of soda as a preparatory step, will be quite vivid, and is the best answer to the claim that a piece of work which is a fixture in the mouth will clean itself, which claim is as near the truth as that the bands are air- and water-tight.

I was asked by a gentleman to remove a piece of bridge-work which had been applied by a believer in this style of denture, and his reasons for desiring to be rid of it were given in stronger terms than I would care about putting on record. They amounted to an assertion that the wearer was conscious of carrying an odor distinctly his own, and which rivaled that produced by the animal who is supposed to have a monopoly in that line; in fact, he stated that his wife thought she had good grounds for avoiding him, and threatened to apply for a divorce.

The theory of bridge-work may be likened to the cow whose milk was good in quantity and quality, but whose failure to set her hind leg down in the same line she had raised it caused a result like the endeavor to apply caps to teeth standing at different angles.—P. A. Palmer, *Chicago*, *Ill.*

Working Celluloid.—There is but one right way to make a celluloid dental plate. First, take a shallow impression of the jaw,—that is, one which does not press the buccinator muscle and other soft tissues out of their normal positions. Shape the model so that it will draw out of the sand easily. Deep undercuts should be filled with plaster cores, which, after being dried slowly, will leave a smoother surface on the metal than sand would. Stop pouring the tin the instant the mold is covered, as the smaller the tin model is the better. Place the model thus made in the lower half of the flask, and file it until it rests on the bottom without touching the sides. Warm a sheet of paraffin and wax, and stretch it as thin as it will bear without parting; place this on the tin cast, which has been previously warmed; trim to the desired shape; apply cold water, and it will come off the tin without sticking. Remove from the articulator the gutta-percha trial-plate and wax with which the bite was taken, and in its place adjust the plate which was fitted to the tin cast. Set the teeth up by dropping the melted paraffin and wax over them; chill the mass in cold water, and use a mouth blowpipe held in the center of the lower cone of the flame of a Bunsen burner to soften the surface where carving is desired. After carving, run a bead one-sixteenth of an inch wide around the top of the gum. Change from the articulator to the warm tin model; press carefully into place; run a little paraffin around the edge, being very careful to exclude all air and water from between the paraffin and tin. Try each tooth to see that the paraffin adheres; otherwise they will be moved out of position when they are invested in plaster. Burnish tin foil lightly but smoothly to the paraffin, and stipple all over with a serrated plugger. The bead of paraffin which is not to be covered with tin foil should be one-quarter of an inch above the plaster, which holds the tin model in place, and the plaster should then be sloped to the edge of the flask.

To get the position and angle of the tin model, before pouring the plaster into the nowel or lower part of the flask, place the model in position on a framework of matches. These matches will remain in the plaster, and will serve to support the heavy tin model in its correct position, no matter how soft the batter may be when poured. When the plaster sets, shellac and oil those parts not covered by the tin foil. In placing the model in the nowel, be careful to place it as near the back of it as possible without touching. If this has been done and the top ring put on, there will be a space between the teeth and the ring wide enough to run your finger around; larger sets, of course, will leave less space.

Now comes the all-important part, which, if slighted, will take ample revenge. Fill a pint bowl nearly full of water. Place a tablespoonful of plaster in a fine sieve and shake it gently over the water; each atom of plaster when saturated with water will sink; so shake slowly, giving each layer time to become saturated. If a cake is formed, it will sink to the bottom as dry plaster, which will form bubbles, making the cast porous, and invariably cause the celluloid to be porous also. Stir occasionally with a wet knife. Continue till about five or six tablespoonfuls have been sifted in, when the mixture will be about the consistence of cream. Let it stand five or ten minutes, and pour off the surplus water. Pour the plaster into the flask at the corner, in a small stream, guarding the teeth with the plaster knife so that the plaster will strike the shellac first and rise slowly around them. When on a level with the ends of the teeth, stop pouring; then, grasping the two parts of the flask between the thumb and forefinger, pound it against the bench for five minutes. This will cause the plaster to settle and the water to rise. If any bubbles do appear, you have made a mistake somewhere. Take a pinch of dry plaster between the thumb and forefinger, and scatter it evenly around the edge of the flask. Now repeat the process of pounding and applying dry plaster (at the edge only), until all the water is absorbed and the investment is dry and the flask filled; then put the top on. If plaster falls into the center of the investment first, it will form a cake and prevent the water from rising. The more time the investment has to set the better; therefore, it is well to invest the last thing before leaving the office; then you can easily finish by noon the following day.

It is necessary to have an inclined-guide, removable-pin flask. Remove the pins, and the flask will easily open without breaking the projecting investment over the alveolar ridge. A small stream of boiling water from a coffee-pot will wash out the paraffin, exposing the tin-foil. Using the New-Mode Heater, have the oven heated to 320°. Close the flask and leave it in the oven for two hours and thirty minutes, by which time the tin and plaster investments will have reached that degree of heat. Be sure that the celluloid blank touches the palatine surface of the cast. If it rests only upon the ridge, the flask cannot close, as celluloid does not stretch or flow. In a majority of cases, a number six blank will have to be used; shorten and file to fit. The palatine portion of the blank must be thinned to the one-thirty-second of an inch by scraping. If on applying a wet finger to the tin cast there is a hiss, it is too hot. Let it stand for a few minutes. When sufficiently cool, place the flask containing the celluloid blank in the heater. Apply pressure very gently at first. In from five to ten minutes the flask will close. In any case, do not continue the heat in the machine longer than ten minutes.

When the flask is cold, place it in water until the plaster is soft. If with a knife or other suitable instrument you cannot pry the celluloid off the metal cast, put it in a tin basin of cold water over a gas-flame. The tin cast will heat before the water boils, when the plate may be easily removed. Always work celluloid in a dry chamber or oven. Steam makes it porous, and should never be used.—Dr. F. W. Seabury, *Providence, R. I.*

A Suggestion.—Many of your readers will remember with pleasure the hospitable manner in which they were treated on the occasion of their visit to London to attend the International Medical Congress, in 1881. They may not be aware that the British Scientific Association has arranged to visit this hemisphere next August. I am advised by my correspondents that a large number of British dentists will be of the party. Their objective point is Montreal, but they have arranged for a considerable tour in the States. It occurs to me, from my acquaintance on both sides, that the majority will be more than willing givers and receivers of any professional hospitality and courtesies that it may be convenient to bestow. For instance, an invitation from the different dental societies holding annual meetings about that time, addressed collectively to the Odontological Society, Leicester Square, London, W., and the arrangement of "clinics" at the New York and Philadelphia depots of the S. S. White Dental Manufacturing Co., would be giving form to the idea.

In the meantime, I should be happy to accommodate your European readers with advice as to traveling, hotels, etc. As your journal affords the best means of reaching the dental profession, I send you this suggestion.—Lawrence Vanderpant, L.D.S., *Orange, N. J.*

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ORIGINAL COMMUNICATIONS.

EMBRYOLOGY: WITH SPECIAL REFERENCE TO THE DEVELOPMENT OF THE TEETH AND CONTIGUOUS PARTS.

BY J. L. WILLIAMS, D.D.S., NEW HAVEN, CONN.

[Read before the New England Dental Society, at Providence, R. I., Oct. 4, 1883.]

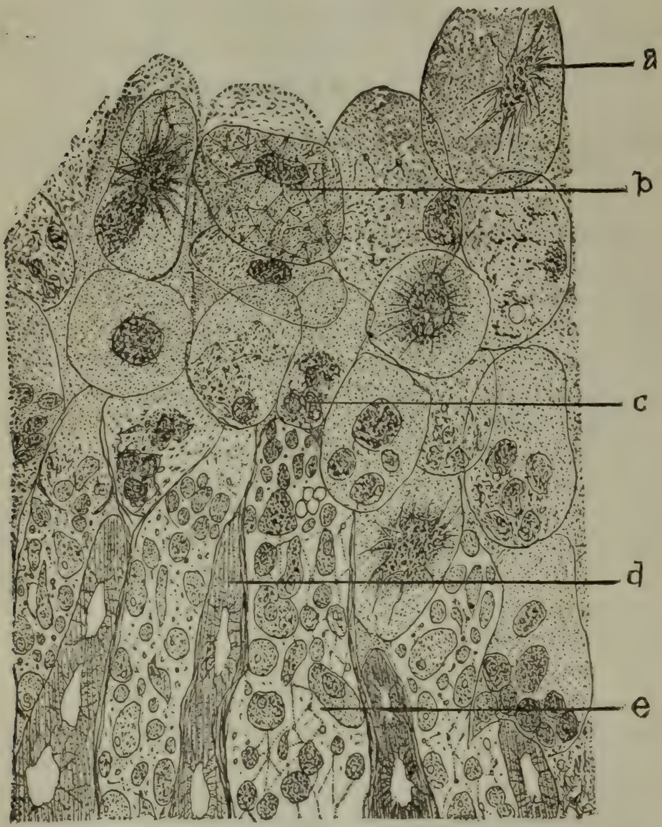
(Concluded from page 262.)

The formation of the bones of the face with the superimposed alveolar structure is coincident with the development of the teeth. Bone is formed in two ways, and according to the method of its formation it is known as endochondral or intermembranous bone, the former (the long bones) being developed in a matrix of cartilage, while the latter is developed directly from the investing membrane, without the intervention of cartilage. To this latter class belong the bones of the face. But the development of endochondral bone possesses a peculiar interest for us because of the process of absorption which is involved, the change of the cartilage corpuscles into embryonal corpuscles previous to the formation of medullary tissue, and the assistance which a knowledge of this process renders us in studying the absorption of the roots of the temporary teeth.

The first stage in the formation of endochondral bone is that of solid hyaline cartilage, which is covered by a membrane called the perichondrium. This membrane, being identical with the periosteum, which it afterwards becomes, is formed of two layers—an external, composed of spindle-shaped cells, and an internal, the true osteogenetic layer, consisting of large spherical cells (the future osteoblasts) with numerous blood vessels. Near the so-called "border of ossification" (*c*, Fig. 21) we observe the cartilage corpuscles increasing in size. In these large, rapidly changing corpuscles I have been able to study the intercellular reticulum of Heitzmann to better advantage than in any other specimens which I have prepared. The bioplasm assumes a variety of shapes and arrangements just prior to its breaking up into embryonal corpuscles. (*a*, *b*, Fig. 21.)

The large, spherical cells of the perichondrium absorb for themselves channels into the cartilage. The presence of these cells in the channels seems to stimulate the cartilage corpuscles into that activity which results in their increase in size, until the lacunæ which hold them unite with each other and finally become confluent with the channels formed by the osteogenetic layer of the perichondrium.

Fig. 21.



Drawn from a section cut from the femur of a human embryo. Magnified about 1000 diameters. *a* and *b*, cartilage corpuscles showing different conditions of the intercorpuscular substance, which is undergoing rapid change prior to breaking up into embryonal corpuscles as shown at *c*; *d*, trabeculæ of bone; *e*, primary marrow cavities.

The accompanying figure shows the "border of ossification," or the junction of hyaline cartilage with spongy bone. One important feature, the "zone of calcified cartilage," lying between the hyaline cartilage and the spongy bone, is not clearly delineated in the drawing, which was made chiefly for the purpose of showing the breaking up of the cartilage corpuscles into embryonal corpuscles and the formation of the primary marrow cavities. (*c*, *e*, Fig. 21.) Projecting into these primary marrow cavities are the trabeculæ of calcified cartilage, which seem to form a sort of skeleton upon which the osteoblasts of the primary marrow cavities arrange themselves or are arranged, and upon which they begin the formation of bone. This formation is the embryonal spongy bone, and is no sooner completed than a new action for its absorption begins from within. These same cells, which at first penetrated the cartilage from the osteogenetic layer of the perichondrium, again become active in the work of absorption in the primary marrow cavities. The trabeculæ of spongy bone melt away and the meshes become confluent into one large cavity—the central marrow cavity, filled with marrow. While this process is going on within, the permanent bone is being formed from the periosteum without.

It is not my purpose to describe in detail the complete process of the formation of bone. Suffice it to say, therefore, that these secondary trabeculæ of bone are again partially absorbed (osteoporosis), and after this process concentric lamellæ are formed by the marrow in the Haversian spaces which hereby become reduced to the Haversian canals. The formation of the intermembranous bones of the skull and face is identical with the formation of the periosteal bone, which succeeds the endochondral bone in all those bones which are formed in cartilage.

It is impossible to distinguish by its histological features a longitudinal section cut from the embryonal lower jaw from a section cut from the shaft of a long bone at a stage when all endochondral bone has disappeared (Klein).

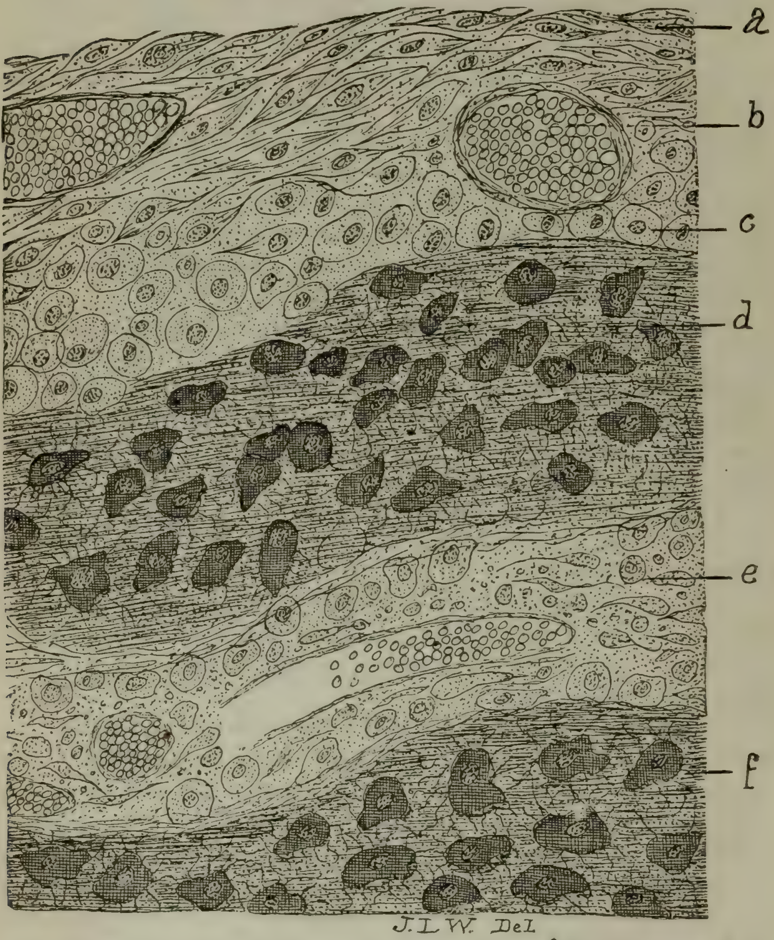
We have seen that the processes of absorption play a very important part in the development of bone, and it is to this particular feature that I desire to call special attention. A careful study of these processes of absorption in bone will remove the obscurities which to many minds seem to surround the process of absorption of the roots of the temporary teeth. It is quite unnecessary, as we shall see, to introduce "absorbent papillæ" or special absorbent "organs" to explain this process.

Wherever the process of the growth of bone is going on there is also the accompanying phenomenon of absorption.

The increase in the size of all bones and the changes in shape which occur in many bones, notably in that of the lower jaw, is due to absorption.

The active elementary agents in this process of absorption are large multinuclear giant cells called osteoclasts. They are developed from the medullary corpuscles or osteogenetic layer of the periosteum. The process of their formation is identical with changes observed in many instances where structural transformations occur in tissues. It has been mentioned several times in the course of this paper, and is denominated a return to the embryonal condition. I have repeatedly emphasized the importance of thoroughly comprehending the physiological significance of the so-called "indifferent" embryonal tissue. It is the universal plane, so to speak, where all

FIG. 22.



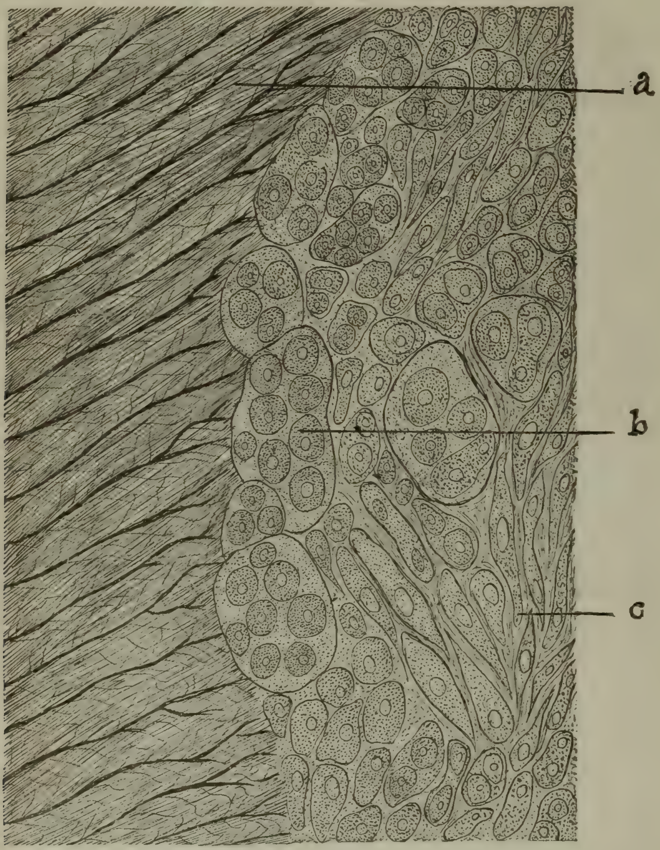
Drawn from longitudinal section of inferior maxilla of human embryo. Magnified about 800 diameters. *a*, *b*, outer fibrous layer of periosteum; *c*, osteoblasts and osteogenetic layer of periosteum; *d*, *f*, trabeculæ of recently-formed bone; *e*, primary marrow cavity.

animal organizations begin and from which all structural differentiations originate. The development of embryonal corpuscles from a tissue preparatory to the formation of a new tissue seems to me to be in accordance with a law of nutrition and structural arrangement which is not generally recognized by physiologists. Keeping in view an important truth, that all animal bodies, organs, tissues and elements of tissues have their *type limitations*, we can readily understand that *any stimulation of the nutrient activities beyond a certain point, after the type limitations have been reached or fulfilled, must result in internal changes of the elements of the tissues.* I believe this to be a statement of a principle which will be found unvarying in all structural changes, whether normal or abnormal.

"Creation proceeds from center to circumference" is a postulate that finds its strongest confirmation in the development of tissues from elements or corpuscles. So far as we know, the molecular arrangement of the matter composing the nucleus of all tissue elements is identical. But this matter surrounds itself with certain structural peculiarities according to its location and the typal force or requirement within it. All physico-chemical changes, or at least all substances which produce physico-chemical changes, are probably developed in the nucleus of the cell. It is the part which possesses the power of assimilation and change by growth and reproduction. Now, the nucleus of the tissue elements is identical in character and powers with the embryonal corpuscle of the primary germinal layers. In the course of development this embryonal corpuscle surrounds itself with matter arranged in certain shapes. It then becomes a tissue element, and the nucleus is that portion of the embryonal corpuscle which persists as the vital (I use the word in its strict scientific sense, as defined in my paper on "Life and Vitality"), living, active part. This portion of the cell is constantly receiving nutritive material, which becomes structural material when it passes beyond the immediate sphere of the nuclear substance. It is evident that the capacity of the nucleus for arranging structural material is limited, and when from any cause the supply of nutritive material exceeds the power of the living matter to organize it, the nucleus increases in size, the surrounding structural material diminishes, and, if the process continues until it disappears, we have the return to an embryonal condition. If the energy and rapidity of this process exceed a certain limit we have inflammation, and later the formation of pus, which is simply the liquifaction of the structural portion of the elements by the increased activity of the living-matter and the formation of pus corpuscles from this living-matter. But, in the transformation of the tissues which are now under consideration, the process by which embryonal corpuscles are formed does not exceed the limits of normal activity.

Fig. 23 was drawn from a section cut from a jaw after the completion of the formation of the temporary teeth. The calcification of the enamel and dentine of the permanent tooth, lying directly beneath the temporary tooth from which this specimen was cut, was quite well advanced.

Fig. 23.



J L.W. Del

Drawn from section of jaw of kitten five weeks old, showing absorption of root of temporary tooth, Magnified about 800 diameters. *a*, dentine; *b*, multiform absorbent cells developed from medullary corpuscles of the pericementum; *c*, outer fibrous layer of pericementum.

It is a valuable specimen because it shows the process of the absorption of the root of the temporary tooth at its commencement. It is plainly seen that the absorbent tissue is developed directly from the pericementum, and probably entirely from the medullary corpuscles or osteo-genetic layer. The large multiform cells which are the active absorbent agents are seen lying in the spherical depressions or excavations which they have produced in the dentine. The increased nutrient activity, undoubtedly immediately caused by the developing permanent tooth, has resulted in the division and subdivision of the nucleus of the medullary corpuscles lying next to the root of the tooth, until each multiform cell is composed of from two to twelve or more smaller cells. Only those are represented in the drawing which were directly in focus, but by gradually changing the focus many more could be seen.

It may be that the lime-salts are dissolved, as suggested by Bilroth and Klein, by the formation of lactic acid, which changes the carbonate and phosphate of lime into soluble lactate of lime, which is taken up and removed by the vessels; but whatever the chemical process may be, from a physiological stand-point the process is in accordance with what has already been written. Both cementum and dentine are the structural materials formed from the osteoblasts or cementoblasts of the pericementum and the odontoblasts, and when these elements are stimulated into a special activity there results the liquifaction of the structural material as observed in many other instances. This view finds confirmation in the fact that, if this process is from any cause arrested, these same elements which have been active in the absorption of the tissue at once revert to their former function of building up the structural material.

As stated at the commencement of this paper, I have not aimed to give a complete résumé of the development of the teeth, and I have therefore avoided repeating, so far as possible, what has been written by other authors upon the subject. But before closing I cannot refrain from inserting a quotation from Dr. Kingsley's "Oral Deformities," for the purpose of showing that his deductions concerning the principal cause of disturbance in the development of the teeth seem likely to find confirmation in the results of the most recent microscopic research in that direction. He says, "Laying aside all cases that may be due to an inherited tendency to follow or exaggerate some given type, together with those which are manifestly due to forces operating only after eruption, the primary cause, so far as the individual is concerned, of any general disturbance in the development of the permanent teeth, showing itself particularly in their malposition, is directly traceable to a lesion or innervation of the trigeminal nerve. It is an interference, more or less prolonged, with one of the prominent functions of that nerve, and *operating at its origin.*" (The italics are mine.) In this statement Dr. Kingsley anticipated by several years the results of those microscopic researches which I believe are destined to establish beyond doubt the soundness of his reasoning. Dr. David Hunt, of Boston, has been for some time engaged in embryological investigations concerning the causation of myopia. His microscopic researches in this field have led him to the conclusion that an enlarged optic vesicle and enlargement of the Gasserian ganglion, by their encroachment on the mesoblastic tissue, constitute the true cause of myopia.

He says, "The equilibrium of the blastodermic membranes, which we may suppose to have existed for ages, is destroyed in the case of man by the conditions of his existence, and more disturbed as he progresses from the ancient caste civilization toward that type of western civilization which, while it has liberated the individual, has also loaded him with an ever-increasing burden of thought, care, and endeavor. The greater size of the cerebral hemispheres causing the greater frontal development of civilized man, the greater complexity of the cerebral convolutions, the greater difference between the weight of the hemispheres must represent a greater development of epiblastic tissue. It is difficult to suppose that such an increase, at least in the head, where the epiblastic and mesoblastic tissues are in such extensive and intimate relations, could have occurred without producing direct results. * * *

"Supposing the causes which have increased the parts of the forebrain, which we have hitherto considered, have also affected the Gasserian ganglion, we should also expect an enlargement of this structure. * * *

"According to the laws governing the increase of other ganglia, it is rational to suppose that the Gasserian is larger in the civilized man than in savages and domestic animals. Provided the increase takes place, it must encroach upon that portion of the connective tissue destined to form the choroid and sclera, and thus weaken these tissues in the part where the bulging or staphyloma occurs."

The Gasserian ganglion is one of the first nerve-centers to become differentiated. At an early period of embryonal life it is nearly or quite as large as the eye. Now, the same line of reasoning which Dr. Hunt has followed in his endeavors to trace the cause of myopia may be brought to bear with equal force on this question of irregularity in the development of the teeth. Any enlargement of the nerve-centers, particularly of the Gasserian ganglion, by encroaching on the mesoblastic tissue from which the jaws are formed, must inevitably affect the arrangement and position of the teeth. The jaws being developed from the mesoblastic tissue, while the size and form of the teeth is largely determined by the enamel organ, which is derived from the epiblastic layer, we can readily understand that causes may be operative which would lead to the development of an abnormally small jaw, while the teeth would be of normal size. The inevitable result must be malposition of the teeth. We cannot yet regard this argument as established beyond question, but it certainly points towards further investigation in this direction, and we hope for sufficient encouragement from the profession to stimulate its continuance.

Comparative embryology is the one field above all others which promises rich returns for our labors in endeavoring to solve these obscure problems. It enlarges our comprehension, as no other study can, of the physiological significance and relation of the different parts of the organism, by showing how multiplicity has been evolved from simplicity of function.

The study of a slowly developing complex organism, with an almost infinite multiplicity and relation of parts, from a single, simple cell, or mass of undifferentiated protoplasm, is one well calculated to impress the mind with a deep sense of that Infinite Wisdom which everywhere seems to lie just beneath the surface of things. I am well aware of the prejudice which exists in the minds of many scientific students against any mention in a paper of this kind of what may not properly be embraced in a bare statement of scientific facts; but I submit that the joy which the discovery of a new truth brings to the mind of the earnest investigator lies not so much in the knowledge that he has added a fact to the sum of human learning, as in the broader and deeper view which it gives of the beautiful adaptation of means to ends in the elaboration of the wonderful phenomena of life.

DENTAL MINISTRATIONS TO CHILDREN.

BY ALTON HOWARD THOMPSON, D.D.S., TOPEKA, KANSAS.

(Read before the joint meeting of the Kansas and Nebraska State Dental Societies, at Hiawatha, Kansas, May 7, 1884.)

The unfortunate and apparently increasing prevalence of caries of the deciduous teeth renders it necessary to their preservation, that children should be placed in charge of the skillful dentist even at a very early age. Indeed, these teeth seem doomed to destruction from their very eruption, and the age of three years is, consequently, none too young for them to receive the benefit of our ministrations. Parents are becoming more enlightened upon this subject, and we are, in consequence, called upon more frequently than formerly to preserve the temporary teeth.

This increasing demand for our services for children is due to the spread of knowledge in regard to general hygiene, and especially to the education of parents in regard to the teeth by the teachings of the dental profession; and while this knowledge is fortunate for the little sufferers, it brings upon our heads an increasing and weighty responsibility in responding to the demand by acceptable service.

And this service is a very delicate and difficult matter to perform; involving, as it does, more or less pain in the performance of operations necessary for the preservation of the teeth, and for patients for whom pain is inadmissible. This is a seeming paradox, and yet we must avoid the infliction of pain, in order to secure the confidence of the little folks and obtain their permission to serve them at all. This is well-nigh impossible, of course, but we must aspire to infallibility to succeed with children.

It is desirable, also, to avoid pain and fright with the child, that we may not create a lasting, life-long dread of dental operations, which is so often due to the keen remembrance of suffering in childhood. This is the fruitful source of much of the terror from which many people suffer when anticipating operations at our hands. Impressions of all kinds are most lasting when made in childhood, and those made by pain are especially indellible and vivid, and if, from accident or bungling on the part of the dentist, the child suffers keenly or is frightened, the memory of that day is a nightmare to haunt him to the grave.

Much, if not most, of the fear of dental operations by children is due to the foolish mismanagement of parents. Very few parents have the wisdom to treat children with the candor their intelligence deserves, even in ordinary matters, and least of all when suffering is involved and a demand needs to be made upon their fortitude and courage. In the matter of extracting teeth, how often does it happen that the child has been cruelly frightened by an insane policy of threats and taunts, and then, after dragging them to the office, we are desired to be parties to a brutality that justly arouses our indignation; or again, there is the equally deplorable policy ot deception and lying by the parent, the child being enticed to the office by false promises that "it will not hurt a bit," etc., and we are requested to assist in the deception and extract the teeth unawares. We are often tempted to turn the parent out of the office, and then by a candid and honest treatment get the child's consent to endure the operation. Nothing can be better for implanting a lasting dread of dental operations than the foolish plans usually pursued by parents.

It should not be necessary for me to urge that the only true system is to treat the child frankly and fairly, according to his own frank nature and natural intelligence. In the first place, always be truthful. Do not deceive the child by either under- or over-estimating, directly or indirectly, the amount of pain or discomfort to be endured. Picture it as clearly and briefly as you can. If a loose tooth is to be removed, assure him plainly of the trifle of pain it will occasion, and appeal to his pride and courage to endure it.

Finding you truthful, he will afterwards believe you, and you will save much subsequent trouble. If more severe pain is to be inflicted by extracting, explain it to him candidly; do not deceive him, but assure him of its transient nature, and appeal to his heroism and ambition for distinction in a courageous act, and you will seldom fail of gaining his consent to operate. Bribery with money or presents is sometimes allowable, but do not even then deceive the child as to the pain to be endured to secure the coveted prize.

Most children have more sense than their parents in regard to such things, and are not slow to understand and appreciate a straightforward and candid manner, and will soon learn to trust the truthful dentist, to confide in his word, and patiently endure what he may require. If deception is practiced, the effect of its disclosure can never be eradicated, and no amount of subsequent careful handling will regain confidence. Children accustomed to deception are the most difficult to manage, and their distrust of all about them is ofttimes pitiful.

If an operation in extraction is to be especially painful, as from protracted ulceration of a deciduous molar, necessitating its premature removal, or the extraction of a first permanent molar, the use of an anesthetic—notably, nitrous oxide—is permissible. As children possess a thorough immunity from the dangers of anesthetics, it is the part of kindness and humanity to employ them in the performance of very painful extractions.

One main source of the dread of dental operations by children is the description they give each other, when talking amongst themselves, of their individual experiences in the dentist's hands, which are embellished by all the exaggeration in which children are so wont to indulge. This exaggeration is, of course, unintentional, and is due to the vivid imagination of childhood, and the fondness for exciting portrayal and story-telling. But it is most demoralizing in its effect on those who listen and who must afterwards come under the dentist's care. With the confidence they have in each other, these vivid descriptions are impressive and well remembered, and utterly demoralize their courage and heroism. In many ways this is the most difficult influence to counteract,—more so even than the indiscretions of parents, and it often requires not a little tact and patience to rally their courage.

There are also some children who, like many grown people, are, to use a vulgarism, so inherently "cussed" that no amount of persuasion and patience will bring them to consent to an operation. They are by nature stubborn and combative, and must be treated by force, if treated at all. But we have only to be candid as to the amount of pain to be endured, and then, if need be, oblige them to submit.

Such a patient will appreciate your candor at any rate, and you will be nearer a victory the next time than if he had been deceived. Sometimes an expectant course is most successful with them, but as a rule they must be treated at once. If they wait their stubbornness but increases.

In the filling of the deciduous teeth the all important preliminary is to secure the confidence of the child. Without that you can do nothing. The first step toward the accomplishment of this essential is to do little or nothing at the first sitting. If there has been odontalgia or other pain, medication will, of course, be necessary; but in no event must pain be inflicted at the first visit. *The child must not be hurt, alarmed, or fatigued* during the first few calls at least. In regard to fatigue, we must bear in mind that their patience is very short, and that we must not overreach it, nor must they be alarmed by much display of instruments. We cannot listen to the oft-repeated request of the parent, "to put it through and be done with it," but on the contrary we must adopt the opposite system of brief visits oft repeated. Very frequently with the three or four-year-olds it will be absolutely essential to do nothing at all at the first sitting, especially if they are timid before strangers, except some trifle that makes a show of working, like passing a burnisher over the teeth or using and explaining the mouth-mirror. This will excite an interest in the novel performance, and arouse a curiosity in our proceedings, which will remain as a sustaining force in future operations. It is necessary to go to some trouble, also, to exhibit and explain the various things that may interest them, and to not tire of answering questions. Then dismiss the little patient before he is tired, or even satisfied, and he will be sure to want to come again. That step secure, and your victory is in sight. At the next sitting you can go a step further and prepare a cavity, or perhaps make a cement filling, taking care to again excite his curiosity and dismiss him before he is fatigued. At the next sitting you can go further, and thus, by gradually drawing him on and on, bring him to the endurance of actual pain. Take care to be candid and honest at all times about pain or discomfort to be endured, and, through confidence thus secured, children can be brought up to such a height of courage and fortitude as would do credit to many of their elders. And, indeed, this gradual treatment is the best in cases of many adults, who indulge and cultivate a foolish apprehension of our operations, or who are really weak and nervous. By beginning with short sittings and gentle treatment, they can be gradually led up to the endurance of things which at the first would have been terrifying in the contemplation and impossible in the execution.

It too frequently happens that the deciduous teeth require our attention for the treatment of caries almost as soon as they erupt. These are congenital defects, either of structure or quality, which doom them to destruction as soon as they emerge from the protecting encasement of the mucous membrane. The labial surfaces of the incisors or first molars are most often the seat of such defects, and the little patient complains of pain in these places at an early age. After securing his confidence by one or two preliminary visits, the best that can be done is the quick application of oxyphosphate filling,—dry, if possible, but submarine, if necessary. In a few weeks—or sooner, if the first application of the cement is lost—prepare the cavity, if possible, and insert a second phosphate filling with care. This is the best that can be attempted in these cavities, and it will frequently be sufficiently durable to tide over until the child is old enough to submit to your doing something better. When it fails it can be easily renewed. When the child is strong, patient, and curious, you can sometimes fill approximal cavities with gutta-percha and grinding with amalgam, both without much preparation, of course; but, as a rule, at the age of three or four years, you will be able to use little but the phosphates. This material is very durable in many mouths, varying in this quality in children as in adults, but it ordinarily lasts well in the deciduous teeth.

In the preparation of cavities for very young children, especially if they are very timid and restless, we are usually compelled to dispense with thorough excavating and with perfect dryness when filling. The little patient cannot, at the first, be induced to tolerate the napkin and the absorbents, and, as the fluids flow rapidly, we must perforce fill submarine, if we fill at all. But as many of the phosphates set well under water, we need not despair of success. Nor dare we encroach upon the sensitive dentine by the too thorough preparation of the cavity; for our little patient must not be hurt nor alarmed in any way. So we will remove what decay we can easily, and fill as we may. This sort of operating may not be theoretically perfect work, but it is the best that can be done, and it is usually as successful practically as that which is more thorough, so we feel warranted in advising it. The texture of the temporary teeth being very soft, it is a question whether sound dentine is a better margin for the contact of a clinging cement filling than hard, carious matter. The progress of the disease will be prevented just as well, and much suffering saved to the little patient, by less thorough excavating.

Once put into good condition, it will be necessary to examine the dentine frequently, in order to replace lost fillings, repair injured ones, and fill new cavities. Once in two to four months will be required, the frequency depending upon the quality of the teeth and the durability of the cement. When the cement fillings last, let them alone; if this material does not wear well, recourse must be had to gutta-percha for approximal cavities and amalgam for grinding. Gutta-percha is good, if the cavity can be prepared, and it is not exposed to attrition, but all exposed cavities must be filled with amalgam. But if the cavity cannot be well prepared, nothing will preserve the teeth so well as the oxyphosphates.

In the larger cavities a good filling can often be made of amalgam, if the margins can be moderately well cleaned and some undercut be made. Of course, no operator of any experience would think of cleaning large cavities—or, indeed, any other in the deciduous teeth—in the direction of the pulp at any rate. These organs are so large, the horns are so long, open spaces leading to them are so frequent, that we must fear encroachment in all large cavities. As trouble so often arises from large fillings, and the pulps die under them so frequently, there is much uncertainty about such operations, as such results would indicate intrusion upon the pulp. So we must be very careful of encroachment and do no excavating over the pulp. A phosphate cap under amalgam or a phosphate filling is little better, for there is a "large-sized" suspicion arising in the profession that perhaps, after all, as an offset to its many good qualities, the oxyphosphate may in time cause the death of the pulp near which it is placed. It is the phosphoric acid presumably —it dies the death of a match-maker. In view of this suspicion, we are in doubt as to the oxyphosphate being the best material to place in contact with the pulp in deciduous teeth. Other materials had best, perhaps, be interposed between it and the pulp, such as the paste of carbolic acid and chalk. But yet, again, as the pulp so often dies, at any rate, under large fillings in the deciduous teeth, we cannot be sure that the phosphate is to blame. The best we can do is to keep as far from the pulp as possible, and avoid all contiguous irritation.

There is much variety of opinion as to the propriety of endeavoring to preserve dead deciduous teeth by filling the pulp-chambers and canals. When a pulp dies, it often seems that no treatment will prevent abscess sooner or later; and especially when ulcerated closing the canals is almost certain to be followed by fistula. That is the usual experience of practitioners, for the successful cases of root-filling are few and far between. For that reason the best operators nowadays concede that dead deciduous teeth had better be left unfilled, thus leaving a safe outlet for the purulent secretions which are certain to form. Sometimes a vent can be made through the filling or the tooth, which will prevent fistula; but this limits the life of the tooth, as caries will soon undermine the filling through the vent. Leaving the tooth unfilled and open usually insures against abscess, and although the crown will disappear soon, the roots will usually last until the successor appears, to preserve space and sustain some mastication. For these reasons, it is now considered inexpedient to fill these teeth when dead.

With the commencement of the displacement of the temporary teeth by the permanent, our cares are increased by the supervision of the proper arrangement of the latter. Frequent calls are necessary during this period, especially when there is any tendency to irregularity by crowding. By close attention much subsequent treatment for irregularity, or perhaps deformity, may be averted. When we have complete control of the child, it is a simple matter to induce regularity by judicious extraction, with the addition, occasionally, of some manipulation on the part of the parent or the child.

It is, however, a critical and important matter to extract judiciously. Sometimes space will be acquired in a short time without the removal of the adjoining deciduous incisor or cuspid before its own time, and when to remove them would lead to a spreading of the permanent incisors, which may afterwards itself require treatment. Then, again, the only thing possible is to extract the adjoining tooth also, to avoid rotation of the central or lateral. This will likely necessitate the ultimate removal of the first bicuspid, to allow the canine to come down when it finds its own space taken up. Again, this will sometimes lead to a contracted arch, and that must be avoided; so that it is always a difficult matter to prognose correctly and decide judiciously. It incurs a responsibility, when we view the possible results of an error of judgment on our part, from which we may well shrink. The danger may be equally great, whether we extract or do *not* extract. All we can do is to study the science of the matter thoroughly by a familiarity with the best authorities; observe the effects closely in practice, and act carefully and honestly. It is always best not to be too hasty; nature may right a wrong without our interference, and should always have a chance.

In addition to the care of the temporary teeth is that of the permanent teeth, during childhood, regarding caries. The conditions, qualities, and environments of each are so very similar as to make the treatment very nearly the same. The permanent teeth at eruption resemble the temporary closely in texture and density, but, of course, the structure is more elaborate, and they gradually increase in density and strength up to maturity. Whatever deficiency of structure exists at eruption is corrected during adolescence, so that at maturity the permanent teeth are much more capable of resisting caries than at eruption. At this time the tooth seems to be a framework, in which the condensation of the solidifying material, the lime-salts, is yet incomplete; but this deficiency is gradually corrected during the growing years. At eruption they are soft and porous like the temporary teeth, and fall early victims to the viscid, corrosive saliva of childhood and adolescence. Greater acidity and less resistance are thus concomitants, and, as a result, the teeth decay more from eruption to maturity, in the ordinary individual with the health at the normal standard, than at any subsequent period of life.

Being thus similar to the temporary teeth, the treatment must be similar. During this critical era the cements and plastics will serve a better purpose in preserving them than gold. At maturity, when the teeth have acquired their complete density, these fillings can and should be removed and gold inserted. It is rare, indeed, that the dental tissues are of sufficiently good texture during the growing years to warrant filling with gold. It is, in the majority of cases, the part of wisdom to fill with gutta-percha and amalgam during these years, and at maturity renew with gold. The frequent examnations necessary will enable you to repair or renew these soft fillings, which are in the nature of an expedient.

The sixth-year molars appear at an age when the child has barely emerged from infancy, and still requires the gentle handling demanded by tender years. These teeth are so imperfect and incomplete as to render them prone to caries, and are so soft and sensitive that the plastics are imperatively demanded in their first treatment. It too often happens that the child's first introduction to the dentist is brought about by the aching of one of these teeth; they are dragged in by the parent to have the tooth extracted, "because it is a first tooth, and will have to come out any way, you know," and we experience not a little difficulty and opposition in the endeavor to convince them of their error and of the necessity for the preservation of the tooth. It fortunately usually succumbs readily to medication, and gives no trouble after treatment with temporary stoppings and careful filling. The value of the tooth and the horrors of its extraction in children make it desirable to preserve it, except where its retention would be a positive injury, or the suffering arising from it cannot be otherwise allayed. Then an anesthetic should be used, for there is no one thing in practice that so moves our sympathies or goes so against the feelings as the horrors of extracting the sixth-year molar for children.

The permanent incisors are not disposed to caries, usually, for a few years after their eruption, but the disease then attacks them on the approximal surfaces. The best preservative in these places during the growing years is gutta-percha, which can be renewed as it wears, until maturity, when gold can be inserted. Approximal cavities on the bicuspids and molars can be treated in the same way, when not exposed to attrition; but those which are partly open to the impaction of food, or those on the grinding faces, had best be filled with amalgam during these years, when the teeth are at all soft, which on the attainment of the density of maturity can be replaced with gold. If the cavities are very large, the phosphates had best be employed, with renewal as necessary.

Finally, let me urge you to be conscientious and devoted in the endeavor to discharge your duty to the blessed children. It is a service that is not always agreeable, but on the contrary is always exacting, and is frequently trying to our patience, our skill, and our strength, and the results are apparently transient and without honor. But our deeds will follow us, and men and women will bless us in future years for the work we humbly and conscientiously performed for them in childhood. Besides that, the sufferings of the children appeal with a resistless eloquence to the sympathies of every one who has a heart, as all those who love children will bear me witness.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

The regular monthly meeting of the New York Odontological Society was held March 18, 1884, at the house of Dr. C. F. W. Bödecker, No. 60 East Fifty-eighth street.

The president, Dr. William Jarvie, Jr., in the chair.

Incidents of Office Practice.

President Jarvie. I have here a model of the upper jaw of a boy between eight and nine years of age, with one permanent central incisor erupted, which is a good, shapely tooth, while in place of the other central is a misshapen crown. There is a decided prominence of the gum on the palatine side of the tooth. The question is, What is it best to do with that misshapen tooth?

Dr. Dwinelle. I see by the cast that the right frontal incisor is well developed; the left one is partially developed, imperfect in shape, irregular in its position, and so twisted that its left side impinges upon the lips. I am inclined to think it is a true incisor, and not a supernumerary. The left temporary lateral is still present; the right temporary lateral has been removed, and there seems to be evidence of the eruption of the permanent lateral. There does not seem to be any sign of abnormality except in that one tooth.

Without much reflection, I am inclined to think that, if it were my case, I should let the permanent disfigured tooth develop as much as it would; then twist it around into position, and afterwards be governed by circumstances.

Dr. Abbott. There are several points of interest in this case. First, the child being about eight years of age, there is hardly a possibility of there being a mal-positioned tooth in the jaw to produce the protuberance showing so plainly in the roof of the mouth. I would inquire of the president whether, from his observation, it may not be due to an inflammation caused by the dead and broken temporary molar upon that side of the mouth?

President Jarvie. No, not at all. It is in an entirely healthy condition.

Dr. Abbott. Of course, it is possible that there may be a tooth in that locality, and that the one in front is a supernumerary. My treatment would be simply this: Let the matter take care of itself for the time being, and wait to see what this prominence will amount to. If no tooth is developed at that point, then I should put that misshapen tooth in its proper position in the front of the mouth, build the crown to a proper shape, and make the most of it.

President Jarvie. I have been requested by the executive committee to present a method of preparing gold crowns. The subject of artificial crowns has, during the last three years, developed as much interest as almost any other item of mechanics connected with our profession. We have had all sorts of devices for building up broken down natural crowns. The method which I have to present is one that has been devised by my associate, Dr. C. B. Parker, for making a gold crown from one piece of metal, without any joint or soldering of any kind. The process is simply this: After taking an impression of the mouth and getting an occlusion, build up the broken crown into the shape you desire it to be when completed with plaster or with oxyphosphate, and carve it into shape, thus getting a model similar to the crown you desire to reproduce; then prepare a wax cap around the neck of the tooth; make the model cone-shaped up to the grinding surface; make a zinc die of the model in this shape, and stamp a piece of gold, getting the grinding surface perfect, but leaving the sides of the crown flaring, as that is; then, removing this piece of wax, make another die from this model in its perfect shape, and strike up the crown. In this way it is a very easy matter to get a well-shaped and perfectly-fitting crown made out of one piece of gold, and without any joints or soldering. If an attempt should be made to strike up the crown without any substance intervening between the gold and the counter-die, the gold would be cut off a little below the grinding surface; but by using a thin plate of lead between the gold and the counter-die, that is entirely prevented. This is as important a feature of the process as any connected with it. It is almost, if not quite, impossible to stamp gold close around the neck without tearing it, unless there is some intervening substance, and lead seems better adapted for that purpose than anything else I have found. Perfect occlusion may be obtained by placing the gold crown upon the root, the patient being directed to close the occluding tooth or teeth upon it. If it is desired to stiffen the crown and thicken the grinding surface, it may be done by flowing a little solder on the inside of the cusps. The crown is attached by roughening the inside surface, partially filling with oxyphosphate of zinc, and forcing into place. As far as I know, and as far as I can learn, there is nó process on record for stamping a crown in this way out of one solid piece without joints. In looking over the books, I have not been able to find such a device recorded.

Dr. Francis. What metal is the die made of?

President Jarvie. Zinc or lead. I suppose Babbitt's metal, or any other metal ordinarily used, would do just as well.

Dr. N. W. Kingsley. I have been making gold crowns for a good many years, and to my mind the method described has one serious fault,—the same fault that I have found with the crown made by Dr. Rynear. My method is to take a strip of gold as wide as I want the crown in length, make it into a ring or ferrule, and fit it to the natural stump. I do not find it necessary to take an impression and make a cast. This band or ferrule can be soldered and completed ordinarily within ten minutes after beginning the operation. It is fitted so closely, that when it is driven on the stump it will not impinge at one or two points only, but will fit accurately everywhere. I believe that such a perfect adaptation is a *sine qua non* essential to success. The absolute certainty that a band made in this way will fit the stump perfectly is seen by looking at it directly with the eye. When the band is fitted and pushed on to the stump, the next step is to take a small piece of wax and place it inside of the ring; then take a bite, remove the ring and wax, and make a little plaster articulation. Carve the wax up so that it shall present a grinding surface that will articulate and occlude with the opposing teeth just as nicely as if it were a natural tooth. Then make a die and swage up the cap, or grinding face of the tooth. I have never found it necessary to alter that cap in order to make it antagonize correctly with the opposing teeth. The cap being the only thing to strike up, one die only is needed. The ring being long enough to reach the grinding surface, a simple cap will meet it. The cap is attached by soldering. When the crown comes to be placed upon the stump it is certain to fit. In almost every case where I have applied gold crowns the diameter of the stump was less than that of the natural tooth which belonged to it, and I could not possibly strike up a crown from one piece that would fit the neck properly on a die that is larger toward the grinding end than at the neck. My objection to the method of striking up entire crowns is that there is no absolute certainty of the accuracy of the adaptation to the stump when the inside cannot be scrutinized; and, secondly, that the true form of a crown cannot be reached in this way, because the neck should be the smallest part.

President Jarvie. How could you get such a ring off the tooth if it was narrower at the neck than at the end of the crown?

Dr. Kingsley. Because it is only the ring, not the gold crown, that is narrower; that is made the size or the diameter of the stump, which is *per se* of less diameter than the crown at the grinding end. If that stump were very long, and so shaped that I could not get the ring off, I should trim it so that it would come off. It must fit closely, or sooner or later there will be trouble. When thus fitted it does not require much additional support. When I use oxyphosphate I drill a small hole in the grinding surface of the gold crown, so as to allow the oxyphosphate to ooze out when the crown is driven on. My criticism of Dr. Jarvie's method is that I cannot see how it is possible to swage up a piece of gold to fit around the neck of a tooth, even if the neck were not of less diameter than the bulk of the crown, and be sure of having a perfect fit. The gold, as we all know, would have to be crimped in about the neck, and with the dies as described it is very difficult to pucker gold into such a position.

President Jarvie. The neck is not any smaller, because the walls must be perpendicular.

Dr. S. G. Perry. I have repeatedly, and for quite a number of years, made bands exactly as described by Dr. Kingsley, except that I use platinum instead of gold, and dispense with the cap. I make the band as wide as the crown is to be long, and, lapping the ends, I fit it over the roots, with the advantage of seeing from the inside that it is accurately adapted. I then mark the ends with the scratch of an excavator, and removing it, solder with gold at the chair, with the assurance that when replaced it will fit accurately. Having dovetailed the roots, I then put the band in position, forcing it down to its place, and burnishing the edges to a close fit on the roots just under the margin of the gums. I then fill the root and nearly all of the band with oxyphosphate. After the oxyphosphate has set, I cut a new dovetail into it, and fill up to and over the edge of the band with amalgam, articulating it at once with the opposing tooth. Sometimes I fill the roots and the band with amalgam throughout, but I prefer the oxyphosphate, as it preserves the roots better than the amalgam. This does not make as artistic an operation as covering the band with a gold cap, as described by Dr. Kingsley, but I think it makes as strong a one, and there is the advantage of being able to perform the whole operation in an hour's time, and without leaving the chair. Of course, it is only suited to the hidden back teeth.

Dr. Kingsley. I do not find it always necessary to make new dies and strike up the grinding ends of crowns in order to make very respectable imitations of the natural teeth. One die, representing the grinding end of a well-formed bicuspid, will strike up forms which will answer for caps for almost all bicuspids. Changing the position will make all the change that is necessary in the way of articulation. But with a ferrule that is nearly or quite the length of a bicuspid, you can without a die and with a pair of pliers cramp it a little this way or that, and change its shape, so that you can make almost as good an imitation as if it were struck up from a special die.

Dr. Crowell. You may take an impression of a crown out of one mouth, and, by altering its position, place it in another mouth, and it will occlude perfectly. Take that crown and reverse it, and place it on the other side of the mouth, and it will occlude perfectly. You may strike up fifty or sixty crowns, and forty of them would fit any mouth,—that is, the grinding surface would.

Dr. E. A. Bogue. I have heard nothing about the use of gutta-percha to fasten crowns with, instead of oxyphosphate. Gutta-percha will not only hold crowns made in the manner Dr. Kingsley describes in their places firmly, but it is an elastic substance, and gives a better representation of the natural tooth and its conditions than any of these absolutely solid substances.

Dr. C. E. Francis. Over twenty-five years ago I put a ferrule-shaped crown over the fragment of a broken superior bicuspid, fitting it nicely to the root, and packing it securely with gutta-percha stopping. A year later I cut away a portion of the stopping, and built out a grinding surface with crystal gold. It did good service for eight years. The fragment of tooth yielded at last to a severe lateral strain and broke; but the filling was apparently as perfect then as the day it was put in. Dr. Kingsley has explained in detail the method I have for a number of years practiced for making and inserting gold crowns; and although I have put on many of them, I have never as yet had one of them turn out a failure. For full crowns there is seldom a necessity for the use of anchors. At first I secured my crowns with gutta-percha; then with oxychloride of zinc, but more recently with oxyphosphate of zinc.

Dr. E. T. Payne. What number do you use for the ring?

Dr. Francis. About No. 30.

Dr. Payne. What karat fineness?

Dr. Francis. Either 20 or 22-karat for the band, and 18 or 20 for the crown.

Dr. Frank Abbott. We often hear it said that "there is nothing new under the sun." One man makes the statement that he has done such a thing within the last year; another man jumps up and says he did the same thing twenty-five years ago, and another that he did it ten or fifteen years ago. The very same plan of restoring crowns of teeth that Dr. Perry describes was adopted and a description published more than thirty years ago, I think, by Dr. Dwinelle. You will find it in the *American Journal of Dental Science.* The same is true of a good many of these later much-talked of operations. Dr. Francis did the same thing twenty-five years ago; and the fact is there is really nothing new, excepting the gold or platinum cap, and its mode of retention. The objection that Dr. Kingsley makes in relation to striking up the crown is, it seems to me, a good one. His plan is easier, and requires less labor and time.

President Jarvie. Prof. Mayr, of Springfield, Mass., will speak to us now on

"THE CHEMISTRY OF DISINFECTANTS AND ANTISEPTICS."

Professor Charles Mayr. Gentlemen, what would any one of you think if you were to stand before a society of chemists and had to say something new in chemistry? I am afraid you would feel exactly as I do at present,—somewhat faint-hearted,—and unless the gentlemen to whom I am to speak are of a kind disposition, and start with the expectation of zero, they will be disappointed. So I wish you to start with the expectation of getting absolutely nothing; then I may hope to give you just a shade more than nothing, and not disappoint you. I do not expect to be able to present much that is new to you, who have been many years studying with the microscope, and with brains reasoning out the problems that come up in your line. Your kind invitation left to me the choice of a subject, and I thought "The Chemistry of Disinfectants and Antiseptics" especially interesting to speak about. We must first clearly understand what we mean by these words. Everybody uses the terms disinfectant and antiseptic rather interchangeably, and I had to make up my mind to become clear what the real difference is between those two terms. I think the best definition of a *disinfectant* is that of a chemical which removes in a chemical manner, by chemical action, offensive substances and odors. An *antiseptic* is a chemical which destroys the agent that produces those substances and odors and prevents re-formation. The disinfectant destroys the offensive product, and the antiseptic the producers of the offensive product.

I have already on former occasions told the story of how Professor Liebig imitated the odors which arise from the excrements of animals and human beings. He took bread, meat, and other substances, and heated them with caustic potash to about 300° Centigrade. He thus obtained a whitish mass, dissolved it in water, added sulphuric acid, and then invited us to an olfactory test; and every one had to acknowledge that he imitated to perfection all the perfumes of excrements. He found that the odors of different excrements were due to imperfect oxidation. This is precisely what we would expect,—when those substances are confined where they are not exposed to the ozone of the air, and the oxidation is not perfect, we get those imperfectly oxygenated products. These are the chief objects of attack of the disinfectants. I can only mention a small number, as my time is limited, and I will confine myself to a few, not because I consider those omitted as not effective. Prominent among purely disinfectant chemicals are elements of the chlorine group chlorine,—and bromine. There was shown in the hygienic exhibition at Berlin last year a peculiar preparation, which is a very wonderful disinfectant. It consists of pressed sticks of silicious earth,—the same as is used in making dynamite,—saturated with liquid bromine. If exposed to the air the bromine evaporates, and oxidizes and brominizes all those offensive odors and substances like ammonia and sulphureted hydrogen. It is probably the best disinfectant known for those odors. Some think bromine has an offensive odor. I do not think so. But disinfectants are not as important to dentists as the antiseptics. If we use an antiseptic properly it will without doubt have the effect of a disinfectant also, by covering foul odors, as carbolic acid does, or combining with the putrid substances.

Antiseptics may be grouped into three different classes. I should say they are: First, those substances which act as actual poisons against low organisms; second, those substances which, so to speak, embalm the producer of the offensive substances; and, third, those substances which prevent the producer of the organisms and putrid substances from reaching the locality we wish to protect. Speaking more especially of the teeth, the first class would be those substances which kill the germs of bacteria and ferments; the second class would be those substances which embalm those ferments or germs and render them innoxious; the third class would be substances which exclude them entirely. To the first class belongs the sublimate of mercury. I do not know that we have anything else that actually kills germs in as weak solution as mercury. How is this to be applied, since, when it is used for a length of time, it has very disagreeable effects upon the system? I do not think there are many well-informed gentlemen who doubt that the offensiveness in the decay of a dead pulp comes—no matter whether directly or indirectly—in the last instance from low organisms called bacteria. The best thing to kill these bacteria is the bichloride of mercury or the corrosive sublimate ($HgCl_2$). We must not employ this bichloride of mercury in a strength which will injure the tissues. Corrosive sublimate, as its name implies, corrodes the tissues, and we only want to kill bacteria, not to kill the tissue. In my opinion a solution of one to one thousand does not kill a tissue, but many experiments have proved that it kills bacteria instantly. The way to apply the bichloride of mercury is to wash or to rinse out the cavity with it, and remove the excess by washing with water. Then comes the second class of antiseptics,—those which embalm these organisms and render them incapable of living again. We never know when we have killed those "bugs;" therefore, we try to embalm them, and for that purpose we use carbolic acid, eucalyptol, and aromatic compounds. These compounds seem to act as embalmers of the living organisms.

The oil of turpentine, a powerful antiseptic, probably acts by its oxygen-carrying power. Let it stand in a glass and it will grow thick; then test it with gum-guaiac, and it will immediately turn blue, showing that the turpentine contains ozone. Turpentine seems to act by burning up the germs. It is objectionable because of its odor. Carbolic acid will embalm, and thereby kill, the germs which the bichloride of mercury has not or has imperfectly reached; it will also embalm the possible food of bacteria,—the protoplasm with which it comes in contact. We now come to the third class of antiseptics. It is not enough that we kill the producers, or make them innoxious, or render the tissue unfit for them, by embalming; we must also prevent a fresh supply from coming in, and for that purpose we fill the teeth. That filling is an antiseptic, and a complete antiseptic, if perfect; and that explains why we want to make a filling perfectly tight. If there is no channel through which the organism can get in, we will have no further sepsis in there. If we only employ the mercury bichloride and then let the matter rest, we will find that after a while it becomes absorbed, so that the teeth again become breeding places, and you may again have symptoms of decay in them; therefore, in order to prevent those symptoms recurring, we have to absolutely exclude those sepsis-producing elements. We find those elements to be animal organisms called bacteria. The making of a filling tight against moisture is not solely for the purpose of keeping moisture out, but because wherever moisture will creep in these bacteria will follow. I had the other day a small specimen under the field of my microscope, with an eighth immersion lens, showing about one one-hundredth of an inch, and I was astonished to find in that space three hundred and forty live bacteria, and room for three thousand more. This shows how small they are, and through how small a hole they may get in. They can march in Indian file, and if there is space for one to come in they will all come in. In keeping out these bacteria consists the antiseptic power of a proper filling, and that explains why dentists have to be so very particular in getting a filling tight. You must exclude moisture, for, wherever there is moisture, there the putrefactive elements will go. They can reach any place where there is not an active defense. In the teeth we have no active defense. The enamel is a passive defense when sound, and it is properly enough arranged to keep out germs; but when the enamel is taken away the dentine is not adapted to that purpose, and, therefore, the effort of the dentist is to accomplish this object in another way, and he meets the attack upon the dentine by putting in a filling that will protect it as completely as the enamel did before. He puts in the filling without cracks or openings, through which nothing can enter, and in this consists its action as the best and most lasting of antiseptics.

I want to speak of another subject, and that is arsenic. Is arsenic an antiseptic? I should say no. Whenever I see a moldy bottle in my laboratory I can wager there is arsenic in that bottle. The other day I opened a bottle, without a label, and smelled of it, and it smelled very bad, and I thought it must be arsenic. I tested the contents, and it proved to be a weak test-solution of arsenite of soda. When dentists use arsenic they do not use it as an antiseptic at all. Arsenic seems to act in forming a chemical compound with the albumen; and you get substantially a substitution product of albumen containing arsenic instead of some molecule of nitrogen, etc. The death of the pulp is due to the arsenic forming a peculiar compound with the albumen,—it becomes arsenized albumen, a different compound. This compound after a while undergoes peculiar changes, and you get what are called ptomes. They have been investigated of late and pronounced very dangerous. You have all heard of the aqua tofani,—a subtle poison. It was also called succession water, because it made princes follow the king very quickly in the government, when the king had been treated with that water. It was prepared by pouring on the dead carcass of a rabbit or sheep a solution of arsenic and letting it stand and ferment; then drawing off the solution. This solution contained volatile principles called ptomes, which are arsenized albumenoids. Whenever I find those fearfully smelling bottles I suspect the odor is due to arsenic in some form of albuminoid compound. The water in Springfield is very impure; contains micro-organisms and their carcasses, etc. When we put an arsenic solution in we get ptomes. The effect of arsenic on the teeth is very different from anything else. When you apply mercury to a tooth you do not get a smell. Pour mercury into water and it remains odorless; the small organisms are killed, and the water remains odorless. The water, which was at first very turbid, settles down to a crystal clearness. But with arsenic it always remains moldy. When you apply arsenic to a tooth you do not use an antiseptic. At first it may resemble in its action an antiseptic, but it is not an antiseptic in any proper sense of the word. People talk about antiseptics in a general way, and their meaning is very vague. We don't know what they are discussing when they become so vague. From any scientific stand-point arsenic cannot be considered an antiseptic, because the sepsis that has been spoken of is not prevented by it—it will not prevent sepsis. If you put arsenic in beer, the beer will run its course of fermentation as if no arsenic was present, but at the same time it begins to smell horribly, for the reason that it forms those ptomes. For that reason arsenic cannot be considered an antiseptic. But if you put into that beer a few drops of the bichloride of mercury, fermentation may go on a few hours and then stop, and you get no putrescent smell. That is a genuine antiseptic.

Carbolic acid is not an antiseptic, unless you use it in sufficient quantity to embalm the animal organisms; for if you do not embalm them they are not killed by it. There are several kinds of carbolic acid, and perhaps it may interest you if I speak a little about them. Carbolic acid, as you know, is a hydrosybenzol (C_6H_5,HO). Benzol (C_6H_6) is a compound consisting of six atoms of carbon and six atoms of hydrogen. For the six atoms of hydrogen we may substitute the radical (hydrosyl) HO, and if we get this HO we get carbolic acid, or phénol, or phenic acid. There are quite a number of these terms also,—acide phénique being one. It is nothing but carbolic acid. You have another antiseptic compound called cresylic acid, which is nothing but carbolic acid in which one atom of hydrogen has been substituted by CH_3, called methyl; therefore, cresylic acid is methylated carbolic acid,—containing methyl instead of hydrogen. There exist a number of other carbolic acids. Creasote is a similar substance, and contains five or six substances which are varieties of carbolic acids, in which one or two of hydrogen have been substituted by methyl, or ethyl, or hydrogen, and those compounds. Another compound which has been used extensively is salicylic acid. It is a product of salicine, a bitter substance in willow bark, and is made in many ways, but at present it is prepared mostly from carbolic acid and caustic soda with the aid of carbonic acid. This salicylic acid is of very little power, compared with the bichloride of mercury, as an antiseptic. There have been used several other antiseptics like boro-glycerin and boracic acid.

One requirement is that these antiseptics should not be washed out too quickly by the circulation in the teeth. We might suppose that there would be no circulation of this kind in the fine canaliculi, but the circulation will go through the coarse canaliculi, and when that is the case anything soluble will be washed away. That is the reason dentists have to some extent abandoned carbolic acid; they do not find it efficacious enough. They went to cresylic acid. Carbolic acid is soluble in the proportions of one in twenty. Cresylic acid is soluble in about one in eighty, and creasote is soluble only in the proportion of one in several hundred. Therefore, these substances would not be washed away as quickly as carbolic acid would be. For this reason carbolic acid is not looked upon with such favor as it would otherwise be. If left in a cavity with cotton, it is too apt in the course of time to be washed out. And then, again, the circulation carries back into the cavity a few germs, and the old trouble is set up again.

To understand the value of antiseptics, it is necessary to understand the operations of decay and putrefaction. It seems to be proved beyond doubt that there can be no putrefaction without living organisms. I cannot see how it can be otherwise. I would rather like to believe, as a chemist, that there are chemical putrefactive ferments; but they do not exist, or, if they do exist, they are again the product of organisms. It may be that the bacteria produce that ferment, but without germs of bacteria there would be no such ferments. The blood in a normal state contains a small amount of those putrefactive germs; we continually inhale them, and they are in the blood. The blood of quite healthy people contains bacteria of all kinds. Therefore, we need not be surprised when we find within the teeth, in a cavity that has no connection with the outside, these putrefactive germs. We have no difficulty when we know that the blood, under normal circumstances and in healthy people, contains a small number of putrefactive bacteria, in accounting for them in the teeth. In people who suffer from abscesses they increase in great numbers; and when they finally increase so that they outnumber the blood-corpuscles, people suffer from septicemia. Before that stage we simply say that they have bad blood, or a little fever, or something like that, but as soon as bacteria begin to appear in great numbers we say there is septicemia. No putrefaction is possible without these organisms, and to prevent putrefaction we have to kill or embalm them, or keep them out.

Silver is also a great poison and antiseptic. Why can we not employ silver compounds? Because there are chlorides everywhere. If we touch the tongue with nitrate of silver it is made white, and we say the silver has burned the tongue; but it has not done any such thing. There was a little salt on the tongue, and it formed a chloride. The chlorides being always present, the silver combines with them and thereby loses its power. Lead is a powerful antiseptic. A solution of gold is a powerful antiseptic. But there is nothing to be compared with mercury. The compounds of baryta will kill bacteria, but not with much rapidity.

Among the organic chemicals there are none to be compared with the mercurials. Iodine, chlorine, and bromine are strong germicides. Picric acid is bitter and unpleasant, and has been considered an antiseptic, but it is not very effective. It has been used in trying to kill the trichina, which is nothing but a big bacterium. We know exactly how that bacterium acts. The picric acid has been tried in Berlin in the case of a person sick with trichinæ. He was perfectly soaked with picric acid, and was as yellow as the "rosy-fingered Eros." Every secretion was yellow, but the trichinæ lived on as well as ever. If the man had been soaked with mercury to such an extent he would have died, and the germs too. Hydrogen peroxide is quite an effective germ-killer, but it has to be used very much stronger than you can get it,—1½ per cent., as you usually obtain it, being much too weak. Select a cavity where you find, besides the germs, the product of the germs, and it will destroy the product of the germs, but will leave the germs relatively unmolested and unharmed. If one single individual remains, all this trouble recurs again.

Dr. S. G. Perry. You did not mention the permanganate of potash.

Prof. Mayr. That is, as I classify them in my mind, more of a disinfectant. The disinfectants are also pretty powerful antiseptics, but, because their action is almost entirely chemical, we cannot properly call them antiseptics. The permanganate of potash acts alike on the tissue, on the products of the germs, and on the germs. But you do not want to act very much on the tissue; and this is where an antiseptic is always distinguished from a disinfectant. A disinfectant is simply chemical in its action, and acts on the tissues, the germs, and their products alike.

Dr. Perry. How do you regard eucalyptol?

Prof. Mayr. I consider it as an embalmer. You embalm all the putrefactive substances, or substances on which germs might feed, by means of eucalyptol. Another very good antiseptic is caustic potash; it is excellent. You will find that a solution of soap hardly ever becomes offensive; a solution of caustic potash will not smell. A solution of soap as strong as one in ten remains perfectly sweet and clean. What we want is that it shall act in very small quantities upon a large extent of territory. Everything is an antiseptic in some way. You can preserve peaches and apples in sugar, but it requires a large quantity. What we want is a very small quantity of a substance to prevent putrefaction. Salt is a good antiseptic, but only in strong solution. In this way almost everything may be a poison or a food,—an antiseptic or a promoter of sepsis. The terms "disinfectant" and "antiseptic" carry with them the meaning of a certain quantity. We do not call a substance antiseptic if we have to use a large amount of it. If, in order to preserve a pound of peaches, we use a pound of antiseptics, we would not call that substance an antiseptic; but if we used twenty grains to the pound, we might call that an antiseptic. The distinction is not sharp. We count as antiseptics substances which kill germs in weak solution.

Dr. Bogue. You did not speak of two substances,—the oxides of tin and copper.

Prof. Mayr. I consider them as pretty weak antiseptics. All those substances which act by their quantity rather than by their quality cannot be classed as antiseptics. Copper salts do not, in small quantities, prevent molding. Diabetic urine is a substance containing sugar. It is tested by Fehling's solution. Put a few drops of excess of copper solution in such urine, and the urine will become offensive, just as much as if no copper were present. But if you put a single drop of mercury solution in excess into the urine, I defy you to get putrescence.

Question. Is camphor an antiseptic?

Prof. Mayr. Camphor is a solid oil of turpentine. It must be classed among those substances which carry oxygen. The blood-corpuscles I consider have an antiseptic action. I presume that blood-corpuscles act as antiseptics by the oxygen they carry. It may be that the oxygen they carry proves disastrous to the germs.

Question. How about boro-glycerin?

Prof. Mayr. A solution of one to five hundred has proved effective to prevent milk from souring. It has a slightly bitter and sour taste, like most compound glycerin acids.

Question. Is it poisonous?

Prof. Mayr. It is not poisonous when used in a quantity that we usually call poisonous. Everything is a poison in certain quantities.

If we should in convalescence from typhoid fever eat ten pounds of beefsteak at one meal, it would probably kill us and prove a poison. When a man has been bitten by a snake he may drink two pints of whiskey, and he will not be in the least drunk. Whether a substance is a poison or not depends entirely upon circumstances. Boro-glycerin cannot properly be called a poison.

Question. Is it used to preserve food?

Prof. Mayr. It has been so used. I should be afraid to introduce boric acid into the circulation; it is not found to be beneficial. It has been tried repeatedly.

Dr. Dwinelle. Is it not a fact that, when poisoned persons are given antidotes in the form of whiskey, they are generally given large quantities of arsenic also? Is not that the treatment where people are bitten by snakes?

Prof. Mayr. It is the first time I have heard of it. I knew carbonate of ammonia was given in such cases.

Dr. Dwinelle. Large quantities of arsenic are given, and also large quantities of opium. In the Gardner case, a number of years ago, where a man was supposed to have died from the effects of a small quantity of arsenic put into a tooth, they attributed the poisonous influence to the arsenic; but they found, on studying the subject, that arsenic was a specific for septicemia; so that, if the man had septicemia and had been given arsenic, he would probably have gotten well.

Prof. Mayr. Arsenic may arouse the body, and thereby affect and kill the germs. Which shall win, body or sepsis, depends upon the strength of that particular constituent of the body which occupies itself in killing bacteria. We do not know what part of the body is most active in killing bacteria. If we strengthen that part which kills the bacteria, we thereby save the patient. We may do that by the use of alcohol, which produces a momentary arousing of the nerve forces. After taking arsenic one will be nervous and excited, and this stimulus will be imparted to all parts of the body, including the germ-killing parts, which are probably the blood-corpuscles; it is there that the germ-killing is usually done. These parts are strengthened and more active, and able to overcome the dangerous enemy. In this way alcohol, arsenic, and morphia act when taken in cases of poisoning from snakes. They strengthen the system, and thereby weaken relatively the germs.

Dr. W. H. Atkinson. Will Prof. Mayr give us the differentiation between fermentation and the breaking down by putrefaction?

Prof. Mayr. There has been quite a war on that point. Taking everything into consideration, I may best define them in this way: Fermentation is the breaking up of a substance not containing albumen, by the presence of lower organisms, into other substances not containing albumen; putrefaction is the breaking up of substances that contain albumen or nitrogenous compounds, by the presence of lower organisms, producing substances which are offensive to our senses. Every fermentation is the breaking up of substances that contain no nitrogen, like starch, sugar, lactic acid, glycerin, etc. If you break up substances containing albumen or nitrogen into substances containing nitrogen again, they become offensive, and you have what is popularly termed putrefaction. In the teeth, in my opinion, you usually have both processes,—the tissue undergoes putrefaction, while the sugar and starch of the food ferment. Sugar and starch may ferment without at the same time the dentine undergoing a putrefactive process. So you get a mixed compound in putrefaction.

Dr. Atkinson. Is it justifiable to say that fermentation is a vegetable act and putrefaction an animal act?

Prof. Mayr. If we understand as vegetable substances those belonging to the vegetable kingdom, or the carbo-hydrates, and animal substances those belonging to the animal kingdom, or the albuminoids, then I would say yes; but animals also produce vegetable substances,—as, for instance, glycogen in the liver, and, as this can be made to ferment, fermentation may be connected with animals. On the other hand, plants contain a great deal of albumen, and you can have perfect putrefaction in plants. Moisten wheat flour, and you first get fermentation; then begins putrefaction. Fermentation goes on as long as the starch remains, and, when the albuminous compounds are attacked, then we have putrefaction. Sometimes both processes go on at the same time.

Dr. Bronson. May I ask the doctor if he makes a distinction between a disinfectant and a deodorizer?

Prof. Mayr. We have to deal with those terms as they are popularly used. In the popular meaning of the terms a disinfectant is almost identical with a deodorizer, but there is a great difference between a disinfectant and a deodorizer. A disinfectant, while it may be a deodorizer, at the same time partakes of the nature of a destroyer of harmful putrefactive odors and of a germ-killer; while a deodorizer means only something that destroys an unpleasant sensation upon our olfactory nerves. The ether that is mixed with iodoform is a deodorizer. For a moment we smell the ether, and the odor of the iodoform is overcome. On the other hand, we cannot, properly and chemically speaking, disinfect iodoform without destroying it. The chemical term includes more; it includes destroying the odorous body.

Dr. C. E. Francis. Our friend has come a long distance to instruct us, and I am sure we have been very much interested. I certainly have, and I move that the society pass a vote of thanks to Professor Mayr for his excellent lecture.

President Jarvie. I hardly think it is necessary to put that motion to a vote, and, therefore, on behalf of the society, I present to Professor Mayr our thanks for his exceedingly interesting and instructive address, and I trust that at some future time we may have the pleasure of having him with us again.

Dr. W. H. Atkinson, being called upon to speak, said: I have not much to say upon this subject, except to enter a caveat against men coming to conclusions without being able to justify them. All that we have heard to-night has been very entertaining and interesting to those who comprehended it, but the principle by which these changes are brought about has not been so much as named. It has been implied throughout that one certain set of molecules are broken up and another set formed in all these changes of either fermentation or of putrefaction. We must find out what it is that produces these changes, and their modes of behavior, before we will be masters of the situation; and until we shall have done that we will only be empirically acquainted with the facts, and consequently will always determine by votes whether we are right or wrong. Whenever we have learned the principles that are involved in these changes so as to comprehend them clearly, although we go slowly, feeling our way, we will be able to go safely as far as we do go. I will speak of the change that occurs in broken-down pabulum or blood, either in the form of pus, sanies, or ichor. In an abscess, when we introduce the peroxide of hydrogen, a very considerable change occurs. A large amount of gas is set free in bubbles, and there is a difference of opinion respecting the kind of gas that forms the bubble. Professor Harlan says it is oxygen that forms it. He assumes that the peroxide of hydrogen is not a new body, but is simply oxygenated water. I regard it as a new body, composed of H_2O_2, and the entire molecule has to be broken up, and then the affinities will express themselves according to their surroundings. If it were oxygen and water, it would simply be a mass of molecules of water with oxygen diffused through it. In using the word molecule, I do not mean atom. Professor Harlan says that the affinity subsisting between the water and the substance of the tissue sets free the other equivalents of oxygen, and that is what makes the bubble. I am not versed in chemistry well enough to assume much on this question, but my impression is that the peroxide of hydrogen, H_2O_2, is a veritable molecule, and by its affinity acts upon the product of the dead tissue, whereby there is a breaking up of H_2O_2 into H_2O, and into O, which has an affinity for the broken-down material by having a greater affinity for the albuminous product, or decomposed products of albumen, that result in sepsis, and thus we get hydrogen, that makes the bubbles. These questions I had hoped to have put directly to Professor Mayr, because he is analytical, and when he gives an opinion it is worthy of our regard. We must not be dogmatic and eschew each other's opinions, when we have nothing but opinions. When we have knowledges, let us stick to them. When we are dogmatic, selfish, and vaporing, it is pretty good evidence that we have not yet attained the knowledge.

Dr. Niles, of Boston. I see those here who are older than I am, and who probably could tell you a great deal more about fermentation and antiseptics; however, I am interested in this subject of antiseptics, and have been since I first commenced to practice. I think the questions of fermentation and putrefaction are questions of the highest and most vital importance to our profession. All theories in regard to decay focus at these two processes. Dr. Miller, of Berlin, is the only man I know who is pushing his knowledge by experiments in the process of fermentation. I do not know that he has experimented separately upon the processes of fermentation and putrefaction, but that evidently will be necessary. I have gone far enough to have demonstrated beyond a doubt that carbolic acid will arrest fermentation and putrefaction. With me this is a settled fact; and since I have been in practice it has been my custom to use carbolic acid—a two per cent. solution in water—in all cavities I prepare to fill. This is the practical point I wish to make, and the only one on this subject. It is also my custom to give to my patients bottles of Calvert's No. 1 carbolic acid, telling them how to prepare it themselves, to use with the brush once or twice a day.

Dr. Atkinson. It is not strong enough.

Dr. A. H. Brockway. You think you have seen marked benefit from its use?

Dr. Niles. I think I have. In two cases certainly I have seen beneficial results. I will not say I use it as strong as two per cent. It is not always prepared in absolutely definite proportions. My patients prepare it. I tell them to take a given amount of water and mix carbolic acid with it, so that it is agreeable to the taste. I use it also in calcareous deposits upon the teeth. But that is entering upon another subject.

Dr. W. H. Atkinson. I would like to say that I have been very strongly impressed with the idea that the various combinations of carbon, hydrogen, and oxygen were only different in their disinfectant and antiseptic power by reason of their strength, depending upon the predominance and position of one set over the other set of elements in the combination. I would as lief have ninety-five per cent. alcohol to wash out cavities with before filling as anything I know of. I conceive that the persistent use of any one of the hydro-carbons would be sufficient as a cleansing wash in any mouth if faithfully followed. I have been exceedingly interested in the use of all the volatile oils, and each time I tried one I felt it was more desirable than any other; but, upon looking the matter over, I doubt whether there is as much difference in them as I thought. Any one of them persistently used will entirely relieve us of the recurrence of decay.

A word or two with regard to a substance mentioned by Prof Mayr, and called listerine. In the first place, I object to the term as illegitimate; and, in the second place, to the polyformic character of the combination, as printed on the labels of the bottles. It puzzles me to know what sort of a mixture I have. I do not think the affinities of the elements in that combination have been sufficiently taken into account by whoever compounded that preparation. It is a pleasant kind of mouth-wash, when diluted sufficiently, and I have no doubt it has a beneficial effect; but we do not know how much substitution takes place, and how many new bodies may be formed. Professor Mayr substantially said there was in it a new body that is not claimed to be in it. We have been advised to use a great many of these remedies, and at intervals we run after one or another of them. There is now a tendency to follow after another, and I predict there will be a run after *naphthaline*. Some protest against the use (or poisonous use) of iodoform, but I have not found it poisonous. I have read of instances where it was said to be poisonous. What is the awakened power in these combinations, and how do they address themselves to the elements of the tissues, so as to be poisons, foods, or remedies in the human body, is what we need to know. It is a fact that, in accordance with the condition of the tissues in the body, substances may be foods, or poisons, or remedies, as Professor Mayr wisely stated. Let us look more in the direction of *how* all these combinations are made, and not give up our minds to generalizations, nor jump at conclusions such as we have been following all the way, without really understanding the difference between an escharotic and a stimulant.

Dr. A. H. Brockway. I would like to ask, if we have in the bichloride of mercury such an antiseptic as fulfills all the conditions that we meet with, as I understood Professor Mayr to claim, why we need bother ourselves with all these others, which are of more or less doubtful utility?

Dr. E. A. Bogue. I will not presume to answer Dr. Brockway's question accurately, but I want to protest against Dr. Atkinson's going back upon himself to-night. I must make my acknowledgments to him for ideas I received years ago, and I feel not a little pleased that the practice which I think he has advocated in the past, and which will almost answer Dr. Brockway's question, and which I have practiced for a dozen years and am practicing to-day, should have met with so perfect a support and corroboration from a man outside of our profession. I fancy that Professor Mayr was contemplating most of the time as he spoke a living tooth, but now and again he was contemplating a dead tooth, and he did not recollect that none of the physiological changes that are taking place in the one are taking place in the other. If the bichloride of mercury is used in a pulpless tooth to destroy the bacterial germs that may be introduced into it, and that are, perhaps, going to produce an abscess, after that tooth shall have been opened by our drill, well and good; but, after destroying our atmospheric germs, we need to thoroughly antisepticize the root-canals and their contents. We therefore proceed to use ninety-five per cent. alcohol, as Dr. Atkinson says, and cleanse that tooth as thoroughly as we may. We then introduce what I suppose to be his preparation of glycerin with thymol, whereby we most completely preserve from future decay the contents of the dentinal tubuli, as well as any remains of animal matter in the further extremities of the pulp-canals, near the foramina. In the process I should use hot air. I should endeavor to desiccate all débris in the interior of the cavity and the dentinal tubuli, both by the use of ninety-five per cent. alcohol and by hot air. I should then get carbolic acid into the cavity. I should then fill the root, and if an abscess supervened in that tooth it would be my loss. I am bound to take pains not to have an abscess there. Another class of cases: Take a living tooth, in which the dentine is extremely sensitive. I can see reason for using, not a two per cent. solution, but full strength carbolic acid, for the purpose of destroying sensibility, and for the purpose of allowing me to throw on a stream of very hot air, which shall dry up the occupants of the dentinal tubuli. Having got my cavity thoroughly excavated, I will dry it a little beyond the point of excavation, and put in my carbolic acid full strength, as Dr. Atkinson once taught, for the purpose of forming an albumenoid. My patient goes away, eats his dinner in peace, without pain, even if he does take a little ice cream, a cup of coffee, or a glass of ice-water.

Dr. Atkinson. Will you please show me the difference between my statement to-night and what you understood me to have stated heretofore?

Dr. Bogue. I understood you to say long ago that you would use carbolic acid full strength.

Dr. Atkinson. Or creasote?

Dr. Bogue. Or creasote. I use carbolic acid in that treatment.

Then I understood you a few years later to have come down to a diluted solution.

Dr. Atkinson. I have never done that to the extent of more than half the full strength. You may have heard that I use carvacrol and creasote, but very seldom carbolic acid. I have long used the carbo-hydrates. I have used the oil of cloves and pure creasote all the time. I never dilute carbolic acid beyond the point I have stated. When topically employed, I have used it in both living teeth and teeth with dead pulps, and I have said that in this you may be sure to have a friend at court,—to have something that would convert the albumen into a carbolate of albumen. That you have just nicely described.

Dr. Bogue. The understanding I have had of late was that you were using it exceedingly diluted, in which I could not agree.

Dr. Atkinson. I do not agree with it either, and I do not know that I have ever said it.

Dr. Bogue. While I could not follow you if you had made such a change, I do not imagine that consistency requires a man to stick to the same thing when he has found a better.

Dr. Frank Abbott. I would like to ask if it is not true that within a year or two Dr. Bödecker stated that in one, two, or three instances he had seen cases where the pulp of a tooth had died from the application of pure carbolic acid to the cavity in a tooth where the pulp was not exposed?—whether he did not, either in reading a paper or speaking before this society, or the First District Dental Society, of this city, state that he considered it dangerous practice?

Dr. Bödecker. I have stated, and I am of the same opinion today, that carbolic acid, when applied in crystals to an exposed living pulp, will under certain circumstances cause it to die.

President Jarvie. When applied to the living pulp without any intervening dentine?

Dr. Bödecker. Without any intervening dentine. I have not stated that I considered it dangerous to apply it to the dentine of a living tooth. On the contrary, it will be found, in the paper which I read before this society in March and April, two years ago, that I was constantly in the habit of using pure carbolic acid in almost every cavity where there is no exposure of the pulp. When the pulp is exposed I take the precaution to use it diluted. But I will not say that carbolic acid will kill an exposed pulp in every instance; I have seen many cases where carbolic acid had been applied to pulps repeatedly, and they did not die. I dislike to use arsenic.

Dr. J. F. P. Hodson. Whatever Dr. Bödecker *intended* to say that night, he certainly did say that it was a dangerous thing to apply carbolic acid full strength in a cavity. He may have had a different statement in his paper, and to have supposed himself to be correctly reading it, but that is what he *said*. I was impressed by the extraordinary statement at the time, and strongly antagonized it in my own mind, because I have been in the habit for many years of using carbolic acid full strength in cavities, under every circumstance and in every case.

Dr. Bödecker. If you understood it that way, I am sure I did not mean to say that. Here it is (producing a copy of the Dental Cosmos) in black and white. I could not say one thing and mean another.

Adjourned.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The First District Dental Society of the State of New York held a regular meeting on Tuesday, November 6, 1883. The president, Dr. A. L. Northrop, in the chair.*

Incidents of Practice.

Dr. Odell. I have been growingly interested and growingly delighted with the action of the Bonwill mechanical mallet. I have been for three years using the electric mallet, and I did not expect to see anything surpass it, except in point of rapidity. Lately I have been performing some large operations, usually starting out with the electric mallet; then picking up the mechanical mallet, and when I do that the patient draws a sigh of relief. Its blow is more like the old hand-mallet than anything I have seen. The unfortunate thing about it is that there are not enough points made to go with it to reach all cases; and to overcome that deficiency I have a little socket arrangement which will take other points. The necessity for changing these points is objectionable—it is a waste of time. I have adapted a great many ordinary foot points to this mallet by simply filing them down, which is easily done. I have in my own mouth a tooth the buccal side of which, from the gum up and the crown, was plated with gold. It is not very thickly covered, but quite extensively as to surface. The operation occupied four hours in the preparation of the cavity at one time, and at another time nine hours in merely packing the gold with the electric mallet—and it is put in in a manner that I feel and know cannot be surpassed. Nine hours, with only fifteen minutes' intermission, is a long sitting. I do not subject a patient to that very often. I have performed more extensive operations, as far as the quantity of gold packed is concerned, in about an hour and three-quarters, using the mechanical mallet, and I am satisfied that no fault can be found in the compactness of the fillings.

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* It is proper to state that the delay in publishing the reports of the meetings and clinics of this society is due to the failure to receive them from the secretary. We are obliged to condense those of past meetings in order to bring the publication up to date as soon as possible.—Ed. Dental Cosmos.

Dr. Jarvis. I have been using the mechanical mallet, and from my experience I would rather be confined to a limited number of points—just enough to reach certain localities. Three or four points is as many as I want. As regards speed, I don't know what Dr. Odell had reference to when he said there was only one point he objected to, seeming to intimate that he would rather have higher speed. I don't want much speed. I find that from two to four or five blows on the same spot are as many as are needed; more than that does more harm than good; and with the mechanical mallet we get more than that probably before we have time to move the instrument, unless we have the gold lying down tolerably smooth, and then keep the point of the instrument in motion. My great objection to the electric mallet was that it would chop the gold up very badly. But I believe it is an improvement upon everything we have had heretofore.

Dr. Bödecker. The gentleman calls attention to the chopping up of the gold by the electric mallet; and there again we see that everything depends upon method. I have been using the electric mallet since 1876, and have, I believe, got thoroughly accustomed to it—so much so that for the last four or five years I had almost exclusively used that instrument, and I think I should as soon chop my fingers off as to take up a piece of gold to build up a tooth and chop it up before the filling is completed. Nobody can expect to restore a contour when he pierces his gold in that way. The gold ought not to be pierced; it ought to be burnished down, and this can be done with the electric mallet just as well as with the mechanical. I have used the latter a little over a month. Its speed can be controlled, and by running it slower you get a finer stroke. But I do not think that should make any difference in the solidity of the filling. If you keep your instrument moving about on the gold it will not pierce it, provided you do not take the instrument absolutely away. In contour work especially you will use to the best advantage the largest point that will work on the surface of your filling. In regard to the advantages of the mechanical mallet, I quite agree with what Dr. Odell has said. A little more than a week ago a young lady was sent to me by a gentleman from California. The two first molars were very badly broken down, the anterior surface of the left and the posterior surface of the right one being completely gone, nothing of either remaining above the gum but a piece the size of a very small lateral. In rebuilding both of them I used a large screw. The decay on the posterior surface went under the gum nearly an eighth of an inch, almost touching the alveolar process, so that I had first to put in a piece of gutta-percha to wedge away the gum, which, at the time I first saw the patient, protruded into the cavity. Each cavity took more than a book of gold (I don't know exactly how much more), and I completed both of those fillings in two sittings, using the mechanical mallet. At the first sitting I built up about half of it, and when the patient came again I carefully washed the filling with absolute alcohol, and, without taking the pains to scrape the outer surface, I applied a leaf of foil, and it adhered just as well as if the rubber-dam had never been removed. Both of those fillings are as solid as if they had been made with the electric mallet. I think the mechanical mallet will be the mallet of the future. The only objection to it, I think, is the motive power, and probably in time that will be supplied by electricity or gas, or something of that kind.

Dr. Rhein. As I was the patient at the clinic this afternoon, it might be of interest to some of the gentlemen for me to say a word or two in regard to this operation. The question was asked me at the clinic whether I did not find the blow of the mechanical mallet more agreeable than that of the electro-magnetic mallet. There were three different kinds of blows used on that one tooth this afternoon; first the mechanical mallet was used, next the electro-magnetic, and then a hand-mallet. Dr. Odell, in his remarks, spoke of one of his patients saying that the sensation produced by the mechanical mallet was nearer to that of the old hand-mallet than any other that had been used upon his teeth. Now, the blow of that hand-mallet was agony compared with that of either of the other mallets; the effect was unbearable when compared with the others, and it was used on my tooth by a very well-known dentist outside of the city of New York. The tooth was very sensitive, and it was rather difficult for me to form a just opinion of which was the most painful, but the conclusion I arrived at was this: that the mechanical mallet, when worked at a slow rate of speed, would not be painful, but when the revolutions of the wheel were increased, increasing the rapidity and force of the blow, it did send a considerable shock through the tooth—more of a shock than I have experienced on a number of occasions with the electro-magnetic mallet. On the other hand, if the electro-magnetic mallet is pressed against the tooth with any amount of power, it will cause a much worse shock than the mechanical gives. But that is not the way it should be used. I have employed the electro-magnetic mallet since September, 1880, and my plan has always been to use it very lightly, in the same manner that I would a pen in a very light handwriting, without shading—merely passing the point over the surface. When used in that manner I have never found it to give any great pain to the patient. Occasionally I have had teeth where peculiar circumstances rendered it necessary for me to apply more pressure, and I found that in that way I could give a great deal of pain with the electro-magnetic mallet. But it is rarely necessary to use it in that manner. My experience this afternoon was that the mechanical mallet, if used in the same way, does not give any more pain; and I think the action of both mallets is very much alike. The points should be passed very lightly over the surface, without any pressure against the tooth from the hand of the operator. Dr. Odell spoke of the relief his patients experience when he changes the electro-magnetic for the mechanical mallet, and Dr. Bödecker was much surprised that I did not experience the same relief. The only explanation I can make is that the relief spoken of was not so much due to the different blow of the mechanical mallet as to the absence of the buzzing noise which the electro-magnetic mallet makes when it is first applied to the tooth, and which, in a large number of patients, produces a very unpleasant sensation. I think the discomfort of the patient is largely due to the noise, and not so much to the blow, if the latter is given in proper manner.

Dr. Bödecker. That is just the point I had forgotten to mention. This lady that I spoke of had every tooth in her mouth filled, and she had had large experience with mallets. The fillings were made very nicely, and I asked her what mallets had been used on them. She told me the automatic and pneumatic mallets had been used formerly, and for the last three years the electro-magnetic mallet. I started the fillings with the electro-magnetic mallet; then took up the mechanical mallet, and when I made that change she immediately said, "You had better use that all the time; it has the best stroke of any mallet I have ever had in my mouth." Afterwards, in some places where I could not very well employ the mechanical mallet, I applied the electric mallet, and the moment I did so the lady was dissatisfied with the stroke and said the other was more pleasant.

Dr. La Roche. Mr. President, with your permission and that of the society, I should like to make a statement upon a subject concerning my honor and standing in the profession.

President Northrop. The doctor will proceed.

Dr. La Roche. What is the true history of the use of the rubber-dam? This is a question that it is my intention to answer by giving the facts that are of my own personal knowledge, and the testimony of those with whom my knowledge is connected—links in the chain. Right here it may quite pertinently be asked why I do this and at this time. My answer is this: in May, 1876, after a residence out of the city of over eleven years, during which time I had been able to attend, I think, but one dental meeting, I returned to New York. Some time thereafter I met my friend, Dr. J. W. Clowes, at a meeting held at a friend's residence, and among other things the subject of the rubber-dam was spoken of by us. I then remarked to him, "Doctor, I have read in the DENTAL COSMOS that you stated at one of the meetings that you believed you were the first to use the rubber-dam in this city. Now, you are mistaken in that; I believe *I* was the first to use the rubber-dam." The conversation was brief, and after it was over I gave the matter no further thought at the time. I certainly did not for one instant imagine that this little passing conversation would create the discussion and tend to cause the contention in the profession that it apparently has; nothing could have been more foreign to my intention. Dr. Clowes, no doubt assuming that I must possess evidence to support my claim and information relating thereto that might be interesting, wrote to me in December, 1877, kindly inviting me to give such information as I possessed concerning this matter. At a meeting subsequently held as a result of his invitation, after the subject had been brought up by him, upon his request for a statement from me, I complied by stating in substance that I firmly and conscientiously believed that I was the first to invent, introduce, and use the rubber-dam as applied in dentistry; that while upon so short and unexpected a notice I was not prepared to adduce competent and satisfactory evidence thereof, yet, nevertheless, I felt very certain that within a reasonable time I could produce such evidence and fully prove my assertion to be true. Since then, as many of you are doubtless aware, this question has been brought up at various times and places, and still continues to arise. It must be settled. Let the whole truth of this matter be known, and *now*. If I could I would always avoid doing any act or saying anything that might provoke a discussion involving delicate questions of this character, or that could evoke any unfriendly feeling or spirit. Rather than do so, though again and again urged to speak, I have remained patiently silent, and would still continue silent; but this matter has now assumed such proportions and portent that, knowing I am right, with the truth on my side, I cannot and will not stand in a false light before the profession any longer. A due respect for myself and my word demands this. Justice is all I seek; honors I ask of none. Therefore, to that end, believing that it is not only a simple act of justice to myself, but a duty I owe to the profession, I am finally impelled to fully and fairly state my case to you upon its own merits. If my claim is a mistaken one, if the credit justly belongs to another, then no one will be more willing to do him honor than I.

When I came to New York, in 1849, and before commencing the study of dentistry, I was during a part of that year and for the three next succeeding years in the employ of Messrs. Van Duzen, Jagger & Co., a firm then doing a large dry goods business in this city. Some two years of the time I was thus employed I spent my evenings in the office of a dentist, studying and working at mechanical dentistry, during which time I frequently made a set of teeth and sold a bill of goods to the same man. In April, 1852, I left their employ and commenced the practice of dentistry. In the store of this firm the Goodyear Rubber Glove Company had an office. Naturally I became acquainted with the representatives of this company, and also quite familiar with the rubber material manufactured and used by them. This association was the germ of my use of the rubber-dam. It was from this company that I subsequently obtained the first rubber to use for a dam. The exact day and month when I first used a rubber-dam I cannot now state, but I do know it was used by me in 1857. To that fact I am ready to make an affidavit at any time. Now for my proof: It consists of the following affidavits from patients and former students of mine. You will observe that most of these deponents live right here in this city. I think almost any unprejudiced man must admit that there is sufficient evidence here submitted to absolutely justify and vindicate me, and to prove with reasonable certainty that my assertion that I first invented, introduced, and used the rubber-dam had for its foundation the truth.

[The affidavits submitted were all duly signed and authenticated by jurat, and are as follows.—Ed. DENTAL COSMOS.]

William A. Skidmore, being duly sworn, says: That in the month of December, 1857, William T. La Roche filled certain teeth for deponent; that at that time the said William T. La Roche made use of a piece of thin rubber cloth with a very small opening cut therein, through which the tooth to be filled was pushed, for the purpose of keeping the cavity in such tooth dry while being filled. Deponent further says that he knows that in 1850 said William T. La Roche was employed by Van Duzen, Jagger & Co., and that a rubber glove company then had an office in the store of the aforesaid firm in the city of New York.

George B. Haines, being duly sworn, deposes and says: That he resides in the city of New York; that in the month of March, in the year eighteen hundred and fifty-seven, William T. La Roche filled a certain tooth for this deponent; that deponent knows that at said time said William T. La Roche used a piece of thin rubber material or cloth for the purpose of keeping the cavity in said tooth dry during the operation of filling the same, by cutting a hole in the said rubber material or cloth and forcing the tooth about to be filled through the hole so made.

Francis F. Reynolds, being duly sworn, deposes and says: That he resides in the city of New York; that in 1857 and 1858 deponent was a student in the office of William T. La Roche, at No. 191 Bleecker street in said city; that at and during said time, namely, 1857 and 1858, deponent knows that said William T. La Roche did use a rubber cloth or dam for the purpose of keeping certain cavities in teeth dry during the operation of filling them; that the manner of using said rubber-dam was as follows: A small hole was cut in a piece of thin rubber cloth; the tooth about to be filled was forced through the aperture so made, and the tooth thus kept from contact with any wet surfaces; that deponent frequently saw said William T. La Roche use rubber cloth in such manner for such purposes. Deponent further says that at the time above mentioned William C. Tinker was also a student in said office.

Elizabeth A. Yale, being duly sworn, deposes and says: That she resides in the city of New York; that in the month of September, in the year eighteen hundred and fifty-nine, William T. La Roche, dentist, No. 191 Bleecker street, filled a certain tooth for deponent; that deponent knows that at said time said William T. La Roche used a piece of thin rubber material or cloth for the purpose of keeping the cavity in said tooth dry during the operation of filling the same, by cutting a hole in the said rubber material or cloth and forcing the tooth about to be filled through the hole so made.

Richard Morary, being duly sworn, deposes and says: That he resides in the city of Havana, Cuba, and is a practicing dentist; that in and during the years 1859 and 1860 deponent was a student in the office of William T. La Roche, in the city of New York; that at and during said time, to wit, 1859 and 1860, deponent frequently saw said William T. La Roche use a rubber cloth or dam for the purpose of keeping certain cavities in teeth dry during the operation of filling them; that said William T. La Roche did at that time, to wit, 1859 and 1860, instruct deponent in the use and proper application of the said rubber-dam. Deponent further says that the use of the rubber-dam, as then and at that time made by said William T. La Roche, was and is practically and substantially the same as is now in general use in the dental profession.

Helen F. Biddle, being duly sworn, says: That she resides in the city of New York; that in the month of December, 1862, at No. 191 Bleecker street, in said city, William T. La Roche filled certain teeth for deponent; that deponent knows that at said time, for the purpose of keeping certain cavities in deponent's teeth dry during the operation of filling them, said William T. La Roche used a kind of rubber cloth through a hole in which he pushed the tooth having such cavity. Deponent further says that she still retains the teeth so filled as aforesaid.

James M. Gano, being duly sworn, deposes and says: That he resides in the city of New York, and is a practicing dentist; that in and during the years 1863 and 1864 he was a student in the office of William T. La Roche, in the aforesaid city; that at and during the said time, to wit, 1863 and 1864, this deponent did frequently see and witness the said William T. La Roche make use of rubber cloth or dam for the purpose of keeping certain cavities in teeth dry during the operation of filling the same; that said William T. La Roche did at the aforesaid time instruct deponent in the proper method of application and use of the rubber-dam as aforesaid. Deponent further says that the use of the rubber-dam as then and at that time made by the said William T. La Roche, was and is practically and substantially the same as is now in general use in the profession.

Oren D. Pomeroy, being duly sworn, deposes and says: That he resides in the city of New York, and is an oculist; that from September, 1864, until April, 1865, inclusive, deponent attended William T. La Roche professionally; that at and during all of said time said William T. La Roche was suffering from ophthalmia; that deponent knows that William T. La Roche at said time was, by reason of his said disease, totally unable to use his eyes for the purpose of reading.

Dr. La Roche. I was living out of New York; my eyes were affected for two or three weeks, so that I did not read more than the headings of the newspapers, and I attended but one dental meeting in eleven years. I was not present when my friend, Dr. Clowes, introduced the rubber-dam at the Cooper Institute meeting, and afterwards when I heard of it I thought it was best to say nothing about it. But what I have said in conversation with my friends has been so misconstrued that I have thought it proper to make this effort to put myself right before the profession. I have lived too many years, and am too well known, I hope and pray, for any one to believe I would say I did a thing which I did not do. I am willing to answer any questions on the subject, and am ready to prove everything I have said.

Dr. Jarvis. It has been our privilege to listen to a wonderful statement. I am certainly very much astonished, and for various reasons. In the first place, I think this society has nothing at all to do with this matter in the form in which it has been brought up, and I felt like protesting against it even before a sentence was read. It certainly was, in my judgment, entirely out of order to bring it before this meeting. Secondly, it has been asserted a number of times over by Dr. La Roche that this subject has been in dispute,—notoriously so; that there has been a great deal of discussion as to who was the inventor of the rubber-dam. I have not been entirely asleep; I have read the dental journals, newspapers, and other publications; I have been to our dental meetings all over the country, and this is almost the first time I have ever heard a suggestion that this matter was in dispute. There has been some slight suggestion to that effect, but it has never really been made prominent to my knowledge. A member of our profession, a neighbor of mine, and starting about the same time in the practice of dentistry,—an earnest, honest, and well-meaning young man,—made an important discovery; one which in subsequent years stirred the very nation with a sense of American ingenuity and inventive genius, and brought plaudits not only across the continent but across the ocean; which became known throughout all the civilized world in connection with an honored name, that is still honored. In view of this, the statement of the gentleman, that he had practiced deliberately for a number of years the use of this wonderful invention and never turned it over to his next-door neighbor, astonishes and pains me, and I feel almost like passing a vote of censure upon him. I remember very distinctly the meeting in Cooper Institute, although I do not remember the year, when Dr. Clowes raised the question as to how we could shut out the water in filling a tooth. He said, "It is capable of being done; there has been a discovery, and it is being done; and how do you suppose it is done?" Then Dr. Clowes went on and explained the matter; he did not state that he had discovered this method, and this is the first time I have heard that Dr. Clowes ever made any claim to be the discoverer of the rubber-dam. We have plenty of proof that Dr. Clowes presented it as the invention or discovery of his nephew, Dr. Barnum. If it emanates from this society that we hold there is any question about this invention,—if this society publishes this statement in its minutes, and it goes upon record that this question is in dispute,—Dr. Barnum is liable to be called on to deliver up the testimonials he has received from all over the country, and the dental profession throughout the world will, perhaps, reverse its verdict. To sum up, I think this is entirely out of place. If I were in the gentleman's position, I should have kept still and said nothing. If it could be thoroughly established that Dr. La Roche was the discoverer and inventor of the rubber-dam, I think it would have been to his credit, as well as to the credit of this society and the profession, if he had said nothing about it now; and I now enter a protest against any further notice being taken of this claim.

Dr. Atkinson. I think, Mr. President, the whole difficulty originates from somebody being a little dishonest, either in the interpretation of what others have said, or in regard to the method in which they came into possession of certain knowledge. A thing comes a great deal more clearly to our apprehension afterwards than beforehand. We remember now very well the time when Dr. Clowes came forward at that meeting with his curious way of presenting the question, asking, if there was such a thing, would not we be glad of it, and all that sort of *ad captandum* business; and how many took note of it at all? Only three or four of us spoke about it, and the rest made light of it. And how long it took to get it into the profession! Some of the most respectable members of the profession then living did not use it, and do not use it to-day. It is probable that if we are in a position to have a truth revealed to our minds, some of our brothers will be in the same position. I have myself had the reputation of making a good many inventions, and I have met a number of men who told me they had made the same invention; and I believe they did make the invention as well as myself. If different persons can see new things in that way, as they often do, it is better for us not to make so much account of American genius, but simply congratulate a man for being fortunate enough to stand in the light of truth when it was revealed. When it is once presented to your minds, it is not such a wonderful thing to think of that an elastic substance with a hole through it should be used to shut off water. It is a very simple thing, but after it has been proved to be a great blessing somebody wants to take the credit of inventing it. Dr. Barnum did not want any credit at that time; he did not think the rubber-dam was worth anything, and his uncle had to apologize to him for presenting him before that body, Barnum had no idea that the thing would amount to what it has. and felt that they were making quite too much of it. I say this for fraternity and truth's sake. As to this question having no business to come before this body, this is the very place it should come. It deserves our attention, because a worthy, truthful brother has been traduced. I do not think there is anything of dishonor in either Dr. Barnum or Dr. La Roche. There may have been lack of appreciation on the part of Dr. La Roche as to the value of this invention and the extent of its use, as there was on the part of Dr. Barnum.

Dr. Abbott. I am glad that this statement has been read, both on my own account and on account of others as well. We will assume that the statements made there are correct. The fact is that in 1857, and for years subsequently, nearly every man in the city of New York, and all over the country and all over the world, who had a good thing kept it to himself. He was very likely to do so; and it was not until the gentleman who has just spoken (Dr. Atkinson) began practicing in the city of New York that there began to be more liberality among members of the profession in these matters, and this liberality commenced subsequently to the time when it is claimed this rubber-dam was used. Dr. La Roche was not living in town at that time, and was not well, it is claimed, and had no idea of its advantages. I remember very distinctly the night when Dr. Clowes presented this rubber-dam question to the old New York Society, and, as Dr. Atkinson has remarked, very few took any interest in it even then; and it had been, according to the statement, in use for several years in Dr. La Roche's office. He had no idea himself of its value and future usefulness. I am glad these affidavits have been read, to establish one thing in my mind, and that is that Dr. La Roche is not a man to tell a deliberate falsehood. Some years ago he said to me that the question had arisen as to who first used the rubber-dam, and he told me that he had used it at such a time; he said he had claimed and stated that he was the first man to use the rubber-dam in this city, and that it was disputed by certain individuals. Since then the question of priority of use of the rubber-dam has arisen, and I have referred to the two claims and have been spoken of quite harshly for making such remarks, because it would reflect upon an individual who has claimed that he invented and introduced it. I simply repeated what I was told.

Dr. Jarvis. I have raised no question of honor. I do not suppose that there is the slightest taint of dishonor in regard to our friend, Dr. La Roche. All I claim is that if I have discovered and used something for a long time, and have not made it public, and somebody else makes a discovery that covers the same ground and makes it public, he is the discoverer and the man to be benefited by it, and I have no claim. I said it was no dishonor, but it is almost a disgrace for one to come up with such a claim afterwards. I might do it in conversation, but should not set up a serious claim, in the manner this has been brought before us to-night. However, I hope we shall not disturb the matter further. I have not the slightest doubt, in view of those affidavits, but what Dr. La Roche used this rubber-dam at the time he states, but he has no claim as the discoverer, because he did not introduce it.

Dr. La Roche. I do not ask for honor in the matter; I do not claim that I introduced the rubber-dam to the profession; but, as a matter of fact, when I introduced it to my students and taught them how to use it I was then virtually introducing it to the profession, for some of my students have used the rubber-dam in the Island of Cuba and have made fillings with it there that I have seen, since, I think, 1859.

The society then adjourned.

James E. Dexter, M.D.S., *Secretary.*

Clinic.

Dr. George S. Meigs filled a left superior first molar, anterior approximal and grinding surfaces, with R. S. Williams's platinized gold, which is a foil made of platinum 20 per cent. and gold 80 per cent. The patient was a gentleman of about forty years; tooth alive, and had been filled with amalgam. The electric mallet was used. Dr. Meigs stated that the platinized gold is harder, wears better on grinding surfaces, and retains its polish and color better than pure gold.

A gentleman presented for the purpose of exhibiting two pivot teeth, superior laterals, set, he stated, by Dr. Weld, of Twenty-sixth street. The crowns were put on, or finished, this morning. The workmanship appeared to be excellent, and was so spoken of.

Dr. S. C. G. Watkins, of Mont Clair, N. J., filled a right superior second bicuspid, posterior approximal surface, making the body of the plug of Robinson's fibrous and textile metallic filling material, covering it with Globe gold foil, No. 4, and using the automatic mallet. The patient was a colored gentleman of twenty-five; tooth alive. Dr. Watkins stated that this fibrous filling material can be packed more perfectly to the walls of the cavity than gold, and that a filling can be made with it in less time than with gold alone. Dr. Bödecker conceded that it could be done quicker, but not that it would be any better than if done with gold only. The time occupied in filling this tooth was fifty-five minutes.

Dr. Watkins exhibited a model of a pig-shaped mouth, caused, he said, by thumb-sucking. The upper teeth protruded much beyond the lower, and at an angle of about forty-five degrees. The age of the patient was twelve years. He proposed to remedy the deformity by extracting the first bicuspids and drawing the incisors back into position by means of a band passing around the head. Dr. Watkins also exhibited a tooth-brush designed by him and named the "Mont Clair." A bunch of bristles near the end projects—longer than those on the major part of the brush; the handle is curved, and the doctor claims that with this brush it is just as easy to clean the molars as it is to clean the front teeth.

Dr. J. W. Cosad, of Jersey City, presented a case of loose teeth, or pyorrhea alveolaris. The patient was a gentleman about fifty years of age. The upper incisors were loose, more especially the two centrals, which were laid bare almost to the apex of the roots. Dr. Cosad said: "This gentleman came to me about two months ago; the incisors, upper and lower, and the superior cuspids were thickly covered with tartar, which I burred off, leaving the roots more or less bare. I treated the gums with aromatic sulphuric acid, iodide of zinc, chinoline, and a little nitric acid; applying the chinoline about every other day, and the other remedies once in four or five days. The mouth is in very much better condition than when I first saw it."

The Economic Motor Company, No. 28 Beekman street, exhibited a small gas-engine called the economic motor, of which the exhibitor said: "The features which recommend it to dentists are its simplicity, cheapness, and economy in operation. The cost is $75, and it burns but about seven feet of gas an hour—a running expense of a little more than one cent an hour. It can be started and stopped almost instantly; needs no attention while running, and cannot get out of order. Two sizes are now made. This is the smaller, and of half-man power; the other size is one-man power. The engine can be placed in the basement with a pulley run through the floor, and there would be neither noise nor smell. The power is derived from the successive ignition in the cylinder of a combustible mixture of illuminating gas and air, which enters the cylinder through automatic valves, and is there ignited."

Dr. Odell filled for Dr. M. L. Rhein the right superior first and second molars, palatal cavities and crown fissures, with Kearsing's gold foil, using alternately the mechanical, the electric, and the automatic mallets. Tooth alive and sensitive. He said: "I take No. 30 gold and double it about eight times before it is used up; that is, I place one end of the strip on the filling and fasten it there; then bring over the other end and fasten that, and so on until the whole strip is packed upon the filling. This tooth I am filling is a twelfth-year molar, with an anterior crown cavity and three pretty deep fissures. There is also a posterior cavity about the size of a small apple-seed, and a palatal fissure less than half that size. All the cavities were run together except the palatal and buccal fissures. I prepared those cavities in two sittings of about two and a half hours altogether. The greater part of it was done with a large chisel; for the fine work I used the machine."

Dr. Rynear exhibited his artificial gold cap or crown. He said: "These crowns are swaged up from one unbroken piece of metal; they are intended as an article of merchandise, and not to be made especially for each particular case." Dr. Rynear also presented a patient with an ulcerated wisdom-tooth, causing partial anchylosis of the jaw; tooth supposed to have a dead pulp. Dr. Mills suggested that an opening be made into the pulp-chamber. Dr. Rynear drilled into the pulp-chamber, after which the patient found considerable relief.

Dr. C. M. Richmond exhibited a new method of setting artificial crowns, simple and inexpensive, which he described as follows: "The pivot is baked in the crown, making one solid mass of crown and pivot; I then cut a hole in the root, fill it with cement, into which the pin is inserted; I then pack amalgam between the crown and the root, making a perfect joint." Dr. Richmond also exhibited another method of crown-setting and bridging, of which he said: "The band and cap are combined with a tube, which is inserted in the root and secured with cement, and into this tube the pin attached to the porcelain crown is cemented with gutta-percha dissolved in ether. The crown can be removed and replaced by a new one in fifteen minutes without disturbing the root. I use this for bridge-work also. The two roots to be used are fitted with caps, bands, and tubes in the same manner as if a single crown were to be used. A pin is attached to each end of the bridge-piece, and these pins are slipped into the tubes and cemented there with gutta-percha, or may be inserted without cement. The piece can be removed for repairs very readily, and the possibility of uncleanliness is reduced to a minimum.

Dr. J. A. Bishop was to have presented a case of fracture of the lower jaw, but the patient was unable to be present. Dr. Bishop gave the following history of the case: "William McM., forty-two years old, was, for the purpose of robbery, beaten insensible, and his lower jaw broken between the left incisors. A large cut behind the chin extended up to the floor of the mouth; the face generally was much swollen, and there was great pain in the glenoid cavities and around the condyles. The displacement of the fragments was very determined, and bandages applied by the medical practitioners were unbearable. Subsequently, at the New York Hospital, the teeth were wired together, but this failing to hold the fragments in place, it was decided to apply a hard-rubber splint. The lower jaw contained sixteen teeth, which were originally short, and had been by wear rendered unusually so. A wax impression was taken of the whole at once; the plaster cast made from this was separated at the point of fracture, and the parts set in place with the aid of a cast of the upper teeth, on the plan first made known by Mr. John Tomes. On putting the splint on, twelve days after the injury, some difficulty was experienced in getting the teeth into place, through adhesions holding the fragments of the jaw displaced. Several openings were cut in the splint, one (the largest) in front of the teeth situated on each side of the fracture, in order to determine the positions of the fragments of the jaw. Although the jaw was allowed its natural movement, the splint was not fastened to the teeth in any way whatsoever, the broken jaw being left to the control of its muscles, which (especially the elevators in closing) are a counter-support to the splint, and force the teeth and jaw upward. In the fourth week after the application of the splint, three pieces of necrosed bone were removed with forceps, and in a few days afterwards another was removed from the mouth of the wound with the fingers. The discharge of pus was much lessened by this, and in five weeks from the application of the splint the wound beneath the chin was nearly closed. When the splint was removed, in the second week after its application, there was but little displacement of the fragments, and on the thirty-fifth day there was good union between the fragments, although it was necessarily very soft, in consequence of the proximity of the suppurating wound. From the time the splint was applied the pain rapidly disappeared, and the man has been quite comfortable, except from the pain of the wound when touched. Now that this is healed, there is every probability that the union of the fracture will rapidly ossify."

Annual Election of Officers.

The society held its annual meeting on Tuesday, April 1, 1884, when the following were elected officers for the ensuing year: Dr.

A. L. Northrop, president; Dr. William Carr, vice-president; Dr. James E. Dexter, secretary; Dr. Charles Miller, treasurer; Dr. J. F. P. Hodson, librarian; Drs. J. F. P. Hodson, C. A. Woodward, and B. C. Nash, executive committee; Drs. C. F. W. Bödecker, Wm. H. Atkinson, and W. Carr, clinic committee.

James E. Dexter, *Secretary.*

HARRIS DENTAL ASSOCIATION.

At the eighteenth annual meeting of the Harris Dental Association, of Lancaster, Pa., held at Lancaster on Thursday, May 1, 1884, the following officers were elected for the ensuing year: Wm. N. Amer, president; J. M. Hill, vice-president; H. D. Knight, treasurer; Alfred D. Clark, secretary; J. D. Heiges, H. D. Knight, J. M. Hill, and Alfred D. Clark, delegates to the State Dental Society.

Alfred D. Clark, *Secretary*, Marietta, Pa.

CONNECTICUT VALLEY DENTAL SOCIETY.

As the dedication of the Buckingham monument takes place at Hartford on June 18, the meeting of the Connecticut Valley Dental Society has been changed from June 18 and 19 to June 19 and 20, 1884, at Savin Rock, New Haven, Conn.

W. F. Andrews, *Secretary*, Springfield, Mass.

INDIANA STATE DENTAL ASSOCIATION.

The annual meeting of the Indiana State Dental Association will be held in Indianapolis, Ind., commencing June 24, 1884, and continuing three days.

The State Board of Dental Examiners will meet at the same time and place.

M. H. Chappell, *President*,
Knightstown, Ind.

NEW HAMPSHIRE DENTAL SOCIETY.

The eighth annual meeting of the New Hampshire Dental Society will be held at Concord, N. H., June 17, commencing at 11 o'clock A.M. All dentists of the State are cordially invited to attend. Preparations are being made for a large meeting.

The Board of Censors will meet for the examination of candidates for license, at Phœnix Hotel, Monday evening, June 16, at 7 o'clock.

E. B. Davis, *Secretary*,
Concord, N. H.

UNIVERSITY OF PENNSYLVANIA—ALUMNI MEETING.

The fourth annual meeting of the Society of the Alumni of the Dental Department of the University of Pennsylvania was held in the Medical Hall of the university, Philadelphia, on the evening of May 1, 1884.

The officers for the ensuing year are as follows: Dr. E. P. Hawes, president; Dr. W. F. Campbell, first vice-president; Dr. J. W. Noble, second vice-president; Dr. J. R. Yorks, third vice-president; Dr. C. T. Howard, recording secretary and treasurer; Dr. G. L. Curtis, 11 E. Jefferson St., Syracuse, N. Y., corresponding secretary; Dr. H. L. Reinecke, orator; Drs. H. L. Reinecke, E. I. Keffer, J. E. Loder, J. B. Entrikin, and A. B. Ely, executive committee.

Chas. T. Howard, *Recording Secretary*,
Rochester, N. Y.

PENNSYLVANIA STATE EXAMINING BOARD.

The Pennsylvania State Examining Board will hold its next meeting during the session of the State Dental Association, in Wilkesbarre, beginning Tuesday, July 29, 1884. Candidates for examination are requested to be present on the first day of meeting, and promptly call upon the president or secretary.

W. E. Magill, *President.*
J. C. Green, *Secretary.*

UNIVERSITY OF PENNSYLVANIA—DEPARTMENT OF DENTISTRY.

The annual commencement of the University of Pennsylvania, including the Department of Dentistry (fifth commencement), was held at the American Academy of Music, Philadelphia, on Thursday, May 1, 1884.

The valedictory address was delivered by Professor Theodore G. Wormley, M.D., LL.D.

The number of matriculates for the session was eighty-eight.

The degree of D.D.S. was conferred on the following members of the dental class by William Pepper, M.D., LL.D., provost of the university:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
J. Gamwell Aldcroftt	New York.	Luther H. Graves	Pennsylvania.
Salvador Bermudez	Nicaragua.	Benedict S. Hert	New York.
Horace A. Bowers	New Hampshire.	Ira C. Hiestand	Pennsylvania.
Wistar P. Brown	Pennsylvania.	Generoso A. Jiminez	Cuba.
W. F. Campbell, M.D.	Pennsylvania.	James E Loder	Pennsylvania.
Nemecio Davila	Chili.	James L. McCance	Pennsylvania.
Jno. W. Emmert	Illinois.	Sam'l J. McMillan	Maryland.
Joseph B. Entrikin	Pennsylvania.	Robert Maercklein	Wisconsin.
S. Erskine, M.D	Pennsylvania.	Howard A. Miner	New York.
Edmund Gastal	Brazil.	Edgar W. Munn	Illinois.
Louis Goettinger	Germany.	Henry B. Noble, Jr	Dist. Columbia.

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Howard G. Provost	Connecticut.	Sidney S. Stowell	Massachusetts.
Philip E. Redpath	New York.	J. Torrence Swartz	Dist. Columbia.
F. Field Robinson	England.	Clarence Tompkins	Pennsylvania.
Abraham L. Shockley	Massachusetts.	William C. Tripler	Pennsylvania.
Luther W. Skidmore	Illinois.	Frank H. Walls	New Jersey.
Leonard S. Stebbins	Massachusetts.	D. Stuart Watson	Pennsylvania.

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EDITORIAL.

THE MARYLAND DENTAL LAW.

The following bill to provide for the better education of dentists and to regulate the practice of dentistry in the State of Maryland has passed the Senate and House of Delegates, and by the approval of the Governor has become a law:

SECTION 1. *Be it enacted by the General Assembly of Maryland*, That it shall be unlawful for any person who is not, at the time of the passage of this act, engaged in the practice of dentistry in this State, to practice dentistry, unless he or she shall have obtained a certificate as hereinafter provided, or shall hold a diploma from a university or college chartered by or under the laws of this State, authorized to grant diplomas in dental surgery.

SEC. 2. *Be it enacted*, That a Board of Examiners, to consist of five reputable practicing dentists, is hereby created, whose duty it shall be to carry out the purposes and enforce the provisions of this act; the members of said board shall be appointed by the Governor, who shall select them from the dentists residing in this State; *provided*, that none of said board shall be pecuniarily connected with any dental college or dental department of any college or university. The term for which the members of said board shall hold their offices shall be for four years, except that two members of the board, first to be appointed under this act, shall be designated by the Governor to hold their offices for the term of two and three for four years respectively, unless sooner removed by the Governor, and until their successors shall be duly appointed; in case of a vacancy occurring in such board, such vacancy shall be filled in like manner by the Governor.

SEC. 3. *Be it enacted*, That said board shall choose one of its members president and one secretary thereof; it shall fix the time and place of its meeting or meetings; a majority of said board shall at all times constitute a quorum, and the proceedings thereof shall at all reasonable times be open to public inspection; the board shall also make an annual report of its proceedings to the Governor.

SEC. 4. *Be it enacted*, That within six months from the time this act takes effect it shall be the duty of every person who is at that time engaged in the practice of dentistry in this State to cause his or her name and residence or place of business to be registered with said Board of Examiners, who shall keep a book for that purpose; the statement of every such person shall be verified under oath before a notary public or justice of the peace, in such a manner as may be prescribed by the said Board of Examiners; every person who shall so register with said board as a practitioner of dentistry may continue to practice the same as such, and shall receive a certificate of such registration upon his or her paying the said board one dollar for such certificate.

SEC. 5. *Be it enacted*, That any and all persons who shall desire to commence such practice may appear before said board at any of its regular meetings, and be examined with reference to their knowledge and skill in dental surgery, and if the examination of any such person or persons shall prove satisfactory to said board, the Board of Examiners shall issue to such persons as they shall find to possess the requisite qualifications a certificate to that effect, in accordance with the provisions of this act, upon the payment of one dollar for such certificate; all certificates issued by said board shall be signed by its officers, and such certificates and diplomas, granted as aforesaid, shall be *prima facie* evidence of the right of the holder to practice dentistry in the State of Maryland.

Sec. 6. *Be it enacted*, That any person who shall willfully violate any of the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction thereof, in any court having criminal jurisdiction, may be fined not less than fifty dollars nor more than three hundred dollars, or be confined not more than six months in the county jail, in the discretion of the court; all fines received under this act shall be paid into the common school fund of the city or county in which such conviction takes place.

Sec. 7. *Be it enacted*, That one member of said board may grant any certificate provided for in this act to any applicant, upon presentation by such applicant of the evidence requisite for the obtaining said certificate, which certificate shall remain in force until the next regular meeting of the said board after the granting of said certificate and no longer, but no such certificate shall be issued by such member after such applicant has been rejected by said board.

Sec. 8. *Be it enacted*, That nothing in this act shall be so construed as to interfere with the rights and privileges of physicians and surgeons in the discharge of their professional duties.

Sec. 9. *Be it enacted*, That this act shall take effect from the date of its passage.

Governor McLane has commissioned Drs. Chas. E. Duck, Richard Grady, E. P. Keech, Edward Nelson, and T. S. Waters a Board of State Dental Examiners under the above law. Of the appointees, the first three are for a term of four years; the other two for a term of two years. All the members of the board live in Baltimore except Dr. Nelson, who resides in Frederick.

NEW JERSEY DENTAL LAW.

The following amendment to the dental law of New Jersey has been passed by the Legislature and signed by the Governor of that State:

A supplement to an act entitled "An act to regulate the practice of dentistry and to protect the people against empiricism in relation thereto in the State of New Jersey," approved March fourteenth, one thousand eight hundred and seventy-three.

1. *Be it enacted by the Senate and General Assembly of the State of New Jersey:* That the first section of the act to which this is a supplement shall be amended so as to read as follows:

[1. *Be it enacted by the Senate and General Assembly of the State of New Jersey:* That from and after the passage of this act it shall be unlawful for any person not now lawfully practicing to engage in the practice of dentistry in the State of New Jersey, unless said person has graduated and received a diploma from the faculty of a reputable dental college chartered under the authority of some one of the United States, and that any person hereafter engaging in the practice of dentistry in the State shall, within one month after commencing such practice, register his name in a book kept for that purpose in the county clerk's office of the county in which he shall have engaged in the practice of dentistry, giving his name, and the name of the dental college of which he is a graduate, and the name of the place in which he shall have engaged in practice, and for which registry the said county clerk shall be entitled to demand and receive from each person registering the sum of fifty cents, and any person violating any of the provisions of this act shall be liable to the penalties prescribed in the sixth section of the act to which this is a supplement.]

BIBLIOGRAPHICAL.

INJURIES AND DISEASES OF THE JAWS: The Jacksonian Prize Essay of the Royal College of Surgeons of England, 1867. By CHRISTOPHER HEATH, F.R.C.S. Third edition. Philadelphia: P. Blakiston, Son & Co., 1884. Price, cloth, $4.50.

It is sixteen years since the first edition of this book was given to the profession, and twelve years since the appearance of the second edition, which was little more than a reprint. It has now been considerably enlarged and modified, and in the attractive shape given it by the American publishers should still command the favor with which it was originally received. The scope of the book includes fractures, wounds, and dislocations of the jaws; inflammatory troubles and their complications and sequelæ; tumors, malignant and non-malignant; disease of the temporo-maxillary articulation; growths of the gums and palate; affections of the antrum; dentigerous cysts, dental tumors, and odontomata.

These subjects are treated very fully and satisfactorily, but an apparent lack of acquaintance with American surgical literature is very noticeable, as is, in fact, a general want of reference to the *recent* literature of these topics. In considering gunshot injuries of the jaws, for example, although the "Medical and Surgical History of the Crimea" is largely quoted from, and allusions are made to reports of the Surgeon-General of the American army made in 1865, there is no evidence that the author ever saw, or at least none that he ever used, the vast material in our surgical history of the War of the Rebellion, and in fact in the whole chapter in question there is not a reference to an article or an author of later date than 1868, that of the first edition.

On the other hand, the author's personal experience has been much more extended, and he has evidently, especially in the portion on tumors, greatly profited by it. The chapter on diseases of the articulation is entirely new, as are several of the cuts, nearly all of which are extremely good. The book is written in a clear, pleasant, entertaining manner, and should be in the possession of every oral surgeon.

Clinical Lectures on Mental Diseases. By T. S. Clouston, M.D., Edin., F.R.C.P.E. To which is added an Abstract of the Statutes of the United States and of the several States and Territories Relating to the Custody of the Insane. By Charles F. Folsom, M.D. Octavo, 550 pp. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $4.00.

The practical importance of a systematic study of mental disease is not to be disputed. No other class of disorders to which humanity is subject so affects the position and prospects not only of those who suffer from it, but of those connected with them by consanguinity. The influence of temperament, diatheses, heredity, and of the animal and organic functions, in their relations to brain-health, is deserving of the consideration of every intelligent individual. If the causes which lead to mental aberration and the hygienic and preventive measures indicated in combating or overcoming wrong tendencies were better understood, there would be less insanity in the world.

In the volume before us the author treats his subject from an eminently practical, because clinical, point of view—that of the facts of disease as seen in the actual experience of the writer. He gives the details of two hundred and sixty cases of mental disease, selected not because of their rarity, but as typical examples of diseased mentalization. The subject is considered in nineteen chapters, embracing a clinical study of the causes, manifestations, diagnosis, prognosis, and treatment of the various forms of mental disorder. Beginning with a definition of what is implied by mental disease,—a deviation from the standard of mental health,—all forms of mental aberration are studied systematically and comprehensively, and each variety is illustrated by one or more examples. Of the utmost practical importance is the attention given by the author to the consideration of the influence of temporary causes, such as changes in the blood-supply, mental strains, excesses, and reflex irritations in affecting the physiology of the brain, and from this stand-point the volume will well repay the thoughtful perusal both of the physician and the layman.

History of the Discovery of the Circulation of the Blood. By Henry C. Chapman, M.D. Philadelphia: P. Blakiston, Son & Co., 1884. Price, $1.00.

This excellent little brochure constitutes a chapter in a work on physiology in process of preparation by the author, but is in itself a succinct and at the same time a most thorough description of the great discovery which established medicine and all its allied sciences upon a rational basis. The different steps which led up to and beyond the period of Harvey, even to the present day, are detailed in a clear and interesting manner, and it is shown that, instead of this grand generalization being the work of one mind, or even of one epoch, it was the gradual outcome of two thousand years of accumulated thought and experience. The book is already so concise that it does not admit of condensation, but is well worth perusal.

PAMPHLETS RECEIVED.

The Bacteria. By Charles S. Boynton, M.D. Read at the March meeting of the Vermont Dental Society, at Rutland, Vt., 1883. Revised January, 1884.

Treatment of Fracture of the Jaw; with Critical Remarks, as sent to Prof. D. Hayes Agnew, M.D. By Thomas Bryan Gunning, D.D.S., New York. Baltimore: Snowden & Cowman, 1884.

Iodoform in Dental Surgery. By C. F. W. Bödecker, D.D.S., M.D.S., New York. Office of the "Independent Practitioner," Buffalo, N. Y., 1884.

OBITUARY.

SAMUEL D. GROSS, M.D., LL.D., D.C.L.

Died, at Philadelphia, Pa., May 6, 1884, Dr. Samuel D. Gross, in the seventy-ninth year of his age.

Dr. Gross was born near Easton, Pa., July 8, 1805; graduated at Jefferson Medical College, Philadelphia, in 1828; began the practice of medicine in Philadelphia; accepted the position of demonstrator of anatomy in the Medical College of Ohio, and after an incumbency of two years was elected to the chair of pathological anatomy, and occupied it for two years more. He was then called to the chair of surgery in the University of Louisville, Ky., a position which (with the exception of one year, in which he filled the chair of surgery in the medical department of the University of the City of New York) he retained for sixteen years. In 1856 he was elected to the professorship of surgery in the Jefferson Medical College, which he filled until his resignation, in 1882, when he was made emeritus professor.

Professor Gross was a prolific writer. Beginning only two years after his graduation, he continued his contributions to medical and surgical literature almost to the day of his death, his last paper being read before the American Medical Association two days after his decease.

No other American has been so highly honored by foreign universities. Oxford conferred on him the degree of D.C.L., and Cambridge and Edinburgh that of LL.D. The same distinction (LL.D.) was conferred on him by Jefferson Medical College and the University of Pennsylvania. He was a member of many foreign medical societies, and held the highest honors in the profession in this country. His great "System of Surgery," which appeared in 1857, and which has gone through six editions, remains as the principal monument to his industry and ability.

The remains of Dr. Gross were, by his own direction, cremated at Washington, Pa., the ashes being subsequently deposited in the family vault at Philadelphia.

DR. HENRY HOBART KEECH.

DIED, at his residence in Baltimore, on Thursday, April 3, 1884, after ten days' illness, of pneumonia, Henry H. Keech, M.D., D.D.S., aged fifty-three years.

Dr. Keech was born January 25, 1831, in Harford county, Maryland. His father, Rev. John R. Keech, was a minister of the Protestant Episcopal Church. His mother was the daughter of Judge John Scott. He spent his youth on a farm owned by his father, and received his earlier education partly from his father's instruction and partly from a district school. He entered the Baltimore College of Dental Surgery, and after the usual course graduated in 1857. He engaged at once in dentistry, and made it the uninterrupted business of his life. He practiced more than a year in several counties of Maryland, but in July, 1858, removed to Baltimore city, where he early acquired a reputation. His career as a dentist covers a period of more than a quarter of a century, and was one of unbroken, ever-growing popularity.

In 1861 Dr. Keech was elected demonstrator of operative dentistry in the Baltimore College of Dental Surgery. In 1873 he was appointed professor of anatomy in the Maryland Dental College, then organized. In 1874 he received the degree of M.D. from the Washington University, Baltimore. Subsequently for four years he occupied the chair of dental pathology and therapeutics in the Maryland Dental College, which he resigned to devote more of his time and attention to mission work.

Dr. Keech was a most indefatigable laborer, and preëminently a man of system and method, governing himself even in the minutest particulars by exact rules. He was the instructor, guide, and friend of many young men who were successively under his care, to whom the results of a practical experience were furnished in a practical form. He was a friend to whose wise judgment and loving sympathy no appeal from the difficulties and perplexities of life was made in vain.

In January, 1860, Dr. Keech married Miss Hattie B. Pigman, who, with one daughter and one son, survives him. In his home he was eminently congenial and companionable, and a devoted husband and father. His circumstances were those of entire worldly ease and comfort, and few men have had a serener life. He took the utmost satisfaction in giving pleasure to others, and his charities were unostentatiously dispensed.

The dental profession, of which he was an ornament, was prompt to recognize its loss. The dentists of Baltimore met and adopted a series of resolutions expressive of their high regard for the pure and useful life of the deceased, and their appreciation of his long and able service. R. G.

PERISCOPE.

Dental Formation in the Nasal Cavity.—Prof. E. Fletcher Ingals, of Chicago, sends us the following regarding misplaced teeth:

Recently, in examining a patient who had for some time been troubled with nasal catarrh, I found on the floor of the left naris, four centimeters back from the nostril, a hard substance, feeling when touched with a probe like bone. On seizing this with forceps the patient experienced severe pain, like that caused by striking a sensitive tooth, and for several hours afterward he suffered from pain like a severe toothache. The pain caused by touching this body was so exquisite that it was necessary to produce complete anesthesia before a thorough examination could be made.

Dr. R. H. Lull administered ether for me, and I then engaged the foreign body in the snare, which I use for nasal tumors, and drew it out, when it was found to be a supernumerary tooth, resembling closely the cuspid, and measuring two centimeters in length. About five millimeters of the tip of the root had been exposed in the nasal cavity, and below this the tooth was covered with soft tissue, which was adhered to it down to the crown. The dentine of the crown was perfect, excepting a small perforation at its apex; but within the tooth was decayed. How long this tooth had been projecting into the nasal cavity could not be determined, but it must have been a considerable time, for the portion of the apex of the root which was uncovered had lost by erosion about a millimeter in thickness from its entire circumference.

It is comparatively rare for teeth to grow in the roof of the mouth or nasal cavities, yet several such cases have been met with. In nearly all instances the "wild tooth," as it is called by the laity, is found to be a supernumerary tooth or a misplaced cuspid.

Prof. E. S. Talbott, who examined the tooth and the patient's mouth, states that, from the appearance of tartar and green stain upon the apex of the crown, it must have occupied a diagonal position in the hard palate, the crown being in the roof of the mouth, pointing toward the central incisors, and the apex of the root in the naris, pointing posteriorly. A ring of tartar encircled the crown from about three millimeters below the upper surface to nine millimeters above the lower surface, and that part of the crown below the ring was covered with a fungous growth, which proved that the part only was exposed in the mouth. The tooth had decayed because of the imperfectly formed apex of the crown, until the pulp had become exposed and death resulted, causing alveolar abscess, the sack of which came away with the tooth. While it is not uncommon to find supernumerary teeth in the roof and anterior part of the mouth, it is very rare to find the apex penetrating the nares. —*Jour. American Med. Association.*

Malposition of a Tooth.—The *Lancet* records a case of supposed tumor in the left nasal cavity, which, on its removal, proved to be a tooth resembling a cuspid. It occurred in a boy of fourteen years of age, who had got his set of permanent teeth, with the incisors and cuspids entire on either side. There was no deformity of the jaw and no swelling or cystic formation. It was clearly a case of extra follicular development and eruption of a tooth in a wrong place. The dental follicle was transposed, and the eruption was from above downwards, the root being deeply imbedded in the side and upper part of the antrum.—*Jour. American Med. Association.*

Suppression of Saliva after Mumps.—Mr. A. St. C. Buxton reports this case occurring in a lady of middle age. No sense of taste was retained; the mouth felt hot, although the temperature was normal; there was intense thirst, which was not relieved by drinking, and there was great difficulty in feeding her. Infusion of jaborandi, iodide of mercury, and mouth-washes of glycerin were equally inefficacious in provoking a flow of saliva. A silver probe was then introduced into the ducts successively, and the negative pole of a thirty-cell Leclanché battery applied to the free end of the probe, the positive pole being applied to the nape of the neck. This proceeding produced a copious flow of saliva, which continued in the normal manner. Complete suppression of saliva in both parotids and submaxillaries is a very rare occurrence.—*The Lancet.*

Solution of Chloral in Wounds of the Mouth.—M. Périer, of the Hôpital Saint Antoine, Paris, has for several years (*Journal de Méd et de Chirurgie*) employed constantly an aqueous solution of chloral to combat buccal inflammations or to prevent the accidents which are consecutive to traumatic injuries affecting the mouth. He formerly used alcoholized water, but gave it up, as, in order to have a sufficiently powerful action upon wounds, the water should contain a very large proportion of alcohol, which makes it more irritating than the solution of chloral. The latter, besides, possesses a true sedative property. If a superficial or deep wound, caused by accident or by surgical means, communicates with the cavity of the mouth, M. Périer prescribes washings and rinsings every two hours at least. Besides which, a careful washing is insisted upon after ingestion of solid or liquid food, as it is necessary to prevent putrescible material from remaining in contact with the denuded surface. If the wound is anfractuous, an irrigator is used, with care not to apply any pressure. Several instances are cited to show the value of this mode of application, where after considerable loss of substance autoplasty has been facilitated and produced excellent results.

The buccal inflammation which accompanies the development of the wisdom teeth is generally relieved by the washings and gargles with the solution of chloral. In the case of peripheral depots of pus for necroses which open at the same time on the skin and in the mouth, the washings and injections through the fistulæ diminish the inflammation and pain rapidly, and suppress the horrible odor which accompanies this species of suppuration. The irrigation is especially insisted upon after the patient has taken milk or bouillon. These two liquids are ordinarily considered to be inoffensive, but, on the contrary, the residue which they leave behind them is precisely that which is most favorable to rapid putrefaction.

M. Périer uses chloral also in other cases. It is very convenient in inflammations of the fingers and of the hand. He uses baths and compresses soaked in the chloral solution. The strength used in all is 1 part of chloral to 100 of water. The compresses are made of one thickness of prepared cotton placed between two folds of tarlatan, over which is laid an impermeable rubber cloth to preserve the humidity as long as possible; the dressings being changed very seldom.—*Jour. American Med. Association.*

Bicentenary of Bacteria.—At the present time, when so many anniversaries of great men and great events are celebrated, it seems opportune to remember that exactly two centuries have passed since a discovery of the greatest consequence was made in the Netherlands. In a letter dated September 14, 1683, from Delft, to Francis Aston, F.R.S., London, Antony van Leeuwenhock gives notice to the Royal Society that, with the aid of his microscope, he has discovered in the white substance adhering to his teeth very little animals moving in a very lively fashion. ("Animalcula admodum exigua jucundissimo modo sese moventia." "Arcana Natura Delicta," Delft, 1695: "Experimenta Contemplationes," p. 42.) *They were the first Bacteria the human eye ever saw.* Among them Leeuwenhock distinguishes several species, the descriptions and drawings of which are so correct that we may easily recognize them. The rods with rapid movement, penetrating the water like fishes, are *Bacilli;* the smaller ones rotating on the top are *Bacterium;* one undulating species is *Vibrio rugula;* the parallel threads of unequal length, but of equal breadth, are *Leptothrix Buccalis:* though motionless they belong to the moving *Bacilli.*

Leeuwenhock wonders how, notwithstanding the scrupulous care with which he cleans his teeth, there could be more animalculæ in his mouth than in all the provinces of the States General. Some years later, not perceiving again the movements of the bacteria between his teeth, he supposes he had killed them by taking hot coffee at breakfast; but very soon he discovers again the old species, and the new drawings of bacillus and leptothrix, which he sends to the Royal Society in the middle of September, 1692 (*l.c.* p. 336), are still more accurate than those of 1683. They have not been surpassed till within the last ten years. It deserves our highest admiration that the first discoverer of the invisible world could have reached a limit which has never been overstepped, though the members of the Royal Society, when considering two hundred years ago, the curious communication of the philosopher of Delft, may have scarcely foreseen that his astonishing discovery had opened to science a new path, which only in our own days has led to the most important revelations about fermentation and disease.—*Ferdinand Cohn, Breslau, in Nature.*

THE TEETH OF THE FUTURE.—In an able address recently delivered, Mr. Spence Bate, F.R.S., has drawn attention to some remarkable features which it may be interesting and instructive to take into account. In the teeth of the Esquimaux, the Red Indians, and the natives of Ashantee, as well as those found in the ancient barrows of England, the so-called interglobular spaces, seen so frequently in sections of modern teeth, appear not to exist; nor, indeed, are they to be detected in the dentine of the best-developed structures of the modern European. Not only is the dentine getting deteriorated, but the enamel would seem likewise to be undergoing a modification—becoming too opaque. In addition to the histological changes, the external form and character of the teeth are sustaining an alteration. This seems to be in relation to an important feature in the history of their evolution. The tendency for the cranium to develop at the expense of the face and the jaws is seen to occur as we ascend the scale of the vertebrated series of animals. Owing to this atrophy of the jaws, the proper space for the full play and development of the normal teeth would seem not to be available. At birth the bones are not sufficiently grown to receive the teeth in their normal arch; and, as in the human mouth the premaxillary bones are firmly united a short time after birth, it follows that the posterior part of the jaw is the only place where growth can occur. Any delay in the development and consolidation of the symphysis must have the effect of contracting the space required for the teeth at this site. In the course of vertebrate evolution there is a marked tendency for teeth to disappear. The lower vertebrates have four molars on each side in each jaw, the higher have three, whilst in man the number is reduced to two.—*The Lancet.*

HINTS AND QUERIES.

WILL some one of your all-gold-work readers please enlighten me as to the cause of gold fillings becoming pitted after a year's time from insertion? Is it because the gold is annealed too much, or not properly condensed? I have been careful as to both, but to my chagrin I find them, after the lapse of the above-named time, looking as if they never were finished. What is the average life of gold fillings?—L. D. S.

ANSWER to J. F. H., in the DENTAL COSMOS for May: Grind flush with corundum points or disks; follow with rubber or wood points and corundum flour or pumice; then use Scotch or Hindostan stones, and finish with felt and chalk wet with alcohol.—H.

T. W. E. (May number of the DENTAL COSMOS) may proceed as follows: Remove all of the superior and inferior roots; antisept, disinfect, and thorougly fill the pulp-chambers of the superior cuspids and bicuspids, filling the crown-cavities, if possible, with gold secured by large retaining-screw posts fixed in the roots. Wait one year, to afford time for alveolar absorption, for the probable eruption of the third molars, and for testing the permanence of the fillings,—meanwhile keeping the patient under frequent observation, and on a diet of food mixed with phosphates and lime-water. If the fillings fail, mount artificial crowns on the roots. At the expiration of the year, make prosthetic restoration.

W.

HOW TO SAVE TEETH FROM DECAY.—Physicians and dentists are daily asked the question, What shall I do to prevent my teeth from decaying? The answer should be: Correct your diet; eat such food and only such as contains all its natural elements. If we eat cereals, we should eat all their elements as furnished by nature. If we eat meat, we ought also to eat bones, or our systems will suffer from a violation of nature's law.

Dental development in man is discernible as early as the seventh week of intra-uterine life, hence the importance of a strictly correct diet from the beginning, if mothers desire to give birth to children who will have perfectly-formed teeth. The observance of this dietetic rule will secure the foundation for a good bony framework. A mother who passes through the periods of gestation and lactation without a sufficient amount of bone and tooth-material in her food will suffer from the decay and loss of her own teeth, accompanied with vital depression and suffering more or less continuous in proportion to the extent of the deficiency. The lime from her teeth will be dissolved, taken into the circulation, and appropriated by the offspring. Excepting civilized man, all flesh-eating animals eat as much of the bone of the animals they devour as they can break with their teeth sufficiently fine to swallow, and all have good dental organs.

Place before a tribe of Indians everything the earth produces in the shape of food, and they will eat only animal food so long as that lasts; but place them upon a reservation, and feed them as civilized people feed themselves, and they too soon suffer from decay of the teeth. Take from either of the above classes the supply of bone which they can get with their animal food, and decay of the teeth is sure to follow. Even our domestic herbivorous animals thrive better when bone is added to their bill of fare. The cow, which every year gives birth to young, has an excessive drain upon her for bone-material, and craves bone to such an extent that she will try to masticate even very large ones, as every farmer's boy can testify.

Veterinary surgeons have long known that certain diseases of their dumb patients can only be successfully treated by feeding to them bone meal. Persons engaged in raising poultry know that their hens must have lime supplied to them, or they will furnish only soft-shelled eggs. Bone is now acknowledged to be the best fertilizer for New England farms. Visit one of these farms in the month of June, and you can count the hills half a mile away, where the corn grew three years before, by the spots of grass that stud the earth at regular intervals. The farmer will tell you that bone did it. The intelligent farmer analyzes his soil, that he may discover the elements that produce his crops If he finds them lacking in quantity or kind, he is careful to make good the deficiency. The stock-raiser informs himself as to the best methods of feeding and caring for his stock. Yet neither appears to recognize the greater importance of carefully regulating his own or his children's diet, and of supplying food which will furnish all of the elements required for healthy growth.

Arguments in favor of eating bone to prevent decay of the teeth, as well as to cure a long catalogue of bone and kindred diseases, might be continued indefinitely, but it seems only necessary to add that a long and continued experiment has been made upon a family, the results of which fully establish the beneficial effect of the bone diet. The bones used were selected from perfectly healthy animals, none being accepted that had the slightest blemish. They were carefully cured, without being allowed to pass through any perceptible chemical changes; were finely granulated, and incorporated into gravies, soups, bread, etc., in the proportion of from one to two spoonfuls to each pint of soup, gravy, or flour.

The relative proportions of nutritive elements in one hundred parts of different kinds of animal food have been found as follows: Beef, 26; pork, 24; mutton, 29; chicken, 27; brain, 20; blood, 21; codfish, 21; milk; 7; bone, 51.—H. E. DENNETT, D.D.S., *Boston, Mass.*

TO THE EDITOR OF THE DENTAL COSMOS:

In the *Dental Register* for May, 1870, a contributor over the signature of "Max" wrote as follows:

"*Harper's Monthly Magazine* for April contains, in its Editor's Scientific Record, an article entitled 'Diseased Teeth among the Ancients.' The remarks therein contained prompted me to make the attempt promised you while in Cincinnati last summer, *i.e.*, to write you an occasional article from Florence, inasmuch as I have had the pleasure of examining teeth that figured at many hash festivals more than two thousand years ago. These teeth are from the tombs of Volterra. Among the few remaining Etruscan cities, to Volterra is awarded the palm of being the most interesting. Etruria, as has been proven, was inhabited by a civilized and intelligent people long before Rome was founded. The entire of Etruria was a confederacy of twelve cities, with their adjacent districts. Their people are supposed to have begun their reign of power in Italy 1000 years B. C. Their navy was at a very early period an arm of power on the Mediterranean. Their vessels visited the most extreme coasts of this sea, and their commerce was found over what was considered at that period the entire world. Proficient in art, they were as dreaded in war. In architecture they, in their special branches, have never found their equals. For instance, in walls for the purpose of defence in case of war, in battlements, and towers, their heavy masonry still stands, the admiration and wonder of every 'son of the trowel.' I don't know where I had contracted the idea, but I had always supposed that folks about that period were generally larger and taller than people nowadays; and, to supply the demand of those big stomachs, I had always imagined that larger teeth were carried around in bigger mouths. But, no, sir! There it lies, a dainty little incisor, as perfect as when its owner 'laid him down to sleep.' And among this rubbish—though rich rubbish for me—I hunted about for diseased members, and was rewarded by gathering a great many,—some decayed even with the process, others slightly. In a word, they were in those times as miserable, troublesome, worrying necessities to the livelihood of man as they are to-day. From the appearance of some of the maxillaries with their quota of teeth, the owners must have died from pains of toothache. Periostitis, necrosis, exposed pulps,—everything in exactly the same manner as the different diseases leave their impress at the present time."

I am gratified to find this distinct corroboration of Dr. Barrett's conclusions from examinations made in a different place, and, therefore, ask for this communication a place in your pages.—W. E. MAGILL, *Erie, Pa.*

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

COSMOLINE IN ITS RELATIONS TO DENTAL THERAPEUTICS.

BY A. B. HARROWER, D. D. S., PHILADELPHIA, PA.

Petrolatum, or petroleum ointment of the U. S. Pharmacopœia, is a term covering the various substances known as vaseline, plain cosmoline, cosmoline sub-cerate, and cosmoline cerate.

The usual sources from which petrolatum is obtained are the crude petroleum oils, from which the lighter portions have been removed by distillation, and the residual substances found in the large oil storage-tanks and in the stills after petroleum distillations in vacuo. The process of obtaining the cosmolines from the reduced oils, as the heavy oils remaining after distillation are termed, consists in distilling them over at a higher temperature than that previously used, and then filtering the distillate, at a temperature of from 110° to 130° F., through animal charcoal. The first portions of the filtrate are used for the cosmolines, and are, if necessary, given the proper consistence by the addition of pure paraffin.

The Pharmacopœia describes petrolatum as a "yellowish or yellow, fat-like mass, transparent in thin layers, more or less fluorescent, especially when melted, completely amorphous, tasteless and odorless, or giving off, at most, a faint petroleum odor when heated, and having a neutral reaction." It will be found quite insoluble in either hot or cold water, and is but slightly affected by cold alcohol, but in about 64 parts of boiling alcohol it will dissolve. It is readily soluble in ether, chloroform, the fixed and volatile oils, and in benzol, benzine, etc. In composition it is a hydro-carbon. Its specific gravity varies from .835 to .860.

Petroleol, or *fluid* cosmoline, is the product of a distillation at a lower temperature than that used in the manufacture of cosmoline proper, the process otherwise being similar. In chemical composition, action in the presence of solvents, etc., it so nearly resembles petrolatum as to render any separate description unnecessary.

Fluid cosmoline is an oleaginous substance, remaining liquid at as low a temperature as 32° F., while plain cosmoline, cosmoline subcerate and cerate are ointments, differing in consistence and remaining firm at the temperatures of 100°, 110°, and 120° F. respectively.

All the varieties of cosmoline named above are bland, unirritating substances, not liable to become rancid or decompose, and, therefore, singularly adapted for use as vehicles or for occupying spaces which should be filled with some soft material, easily removable, non-irritant, insoluble, and incapable of decomposition under the surrounding conditions.

It was the possession of the foregoing attributes which led to some experimentation with cosmoline and its consequent employment as an excipient in iodoform, arsenical and inspissated canal pastes, and for the saturation of cotton canal dressings.

In the previous employment of iodoform as an antiseptic in the treatment of pulpless teeth, the formula adopted by Prof. Flagg, after years of experiment and use, was the same as that given in the DENTAL COSMOS for November, 1883 (p. 616), namely:

℞.—	Iodoform,	30 grs.
	Tannic acid,	3 "
	Glycerin,	15 drops.

(NOTE.—The 10 *grains* of iodoform as given in the former recipe was a copyist's error; it should have been 30 *grains.*)

This mixture, while comparatively free from the disagreeable odor of iodoform,—and rendered entirely so by the addition of a part of a drop of oil of cinnamon,—had yet the disadvantages of a soluble vehicle and the formation of ferrous tannate when brought in contact with steel probes, etc. Although these objections were not of pressing moment, yet there seemed to be room for improvement, and after some experimentation I settled upon the following formula as meeting all the indications, both theoretical and practical:

℞.—	Iodoform, crystals,	20 grs.
	Fluid cosmoline,	10 drops.
	Oil of cinnamon,	about ¼ of a drop.*

Mull the iodoform to a *fine* flour in a small mortar; add the cosmoline and cinnamon, and mix thoroughly.

The resulting mixture will be a smooth paste, of a pale yellow color, having a slight odor of bitter almond or cinnamon, and a consistence which permits of its being worked to any part of a root-canal accessible to a fine probe. It is unalterable, insoluble, easy of manipulation, does not taint the atmosphere of the office with the odor of iodoform, and in fact fulfills all the requirements of an iodoform canal dressing.

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*Excess in the quantity of cinnamon tends to cause a change of color and consistence in the paste, detracting from its appearance and working qualities.

This paste has been in daily use in our office for nearly a year, and has steadily gained in favor. It is also employed by upwards of a hundred gentlemen, and, so far as can be ascertained, with entire satisfaction.

When it is desired to use iodoform as a pulp-capper, etc., the requisite consistence is easily obtained by substituting for the fluid cosmoline in the preceding formula a sufficient quantity of plain cosmoline, cerate, or sub-cerate.

Few who have used arsenical paste have escaped the annoyance consequent upon the settling of the arsenic and the stirring necessitated by this separation. Every time the mixture is used it must be stirred, and this stirring not only unpleasantly soils any instrument used in the process, but imperfectly mixes the different strata. A much more elegant preparation, perfectly smooth, entirely free from the objections previously mentioned, and which permits of a much more accurate placing of an arsenical application, can be obtained by mixing with ordinary arsenical paste a sufficient quantity of plain cosmoline or cosmoline cerate.

The following formulæ more nearly fulfill the requirements of a perfect arsenical paste than anything I have seen:

1. ℞.—Arsenious acid, 1 part.
Acetate morphia, 2 parts.
Plain cosmoline, q. s. to make a paste of the desired consistence.

2. ℞.—Arsenious acid, 5 grs.
Acetate morphia, 10 "
Fluid cosmoline, 18 drops.

In both cases mix thoroughly.

It will be noted in these two cases that carbolic acid, as a component, is omitted. I have failed to find any *theoretical* ground for its retention, and, so far as used, the two preceding formulæ have offered no practical objections against its abandonment.

The formula for the inspissated canal paste used by Prof. Flagg, during the past five years, for filling the canals of lower and inaccessible canals of upper teeth was:

℞.—Sulphite lime, } āā.
Acetate morphia, }
Glycerin, q. s.

This, though a soothing and antiseptic mixture, was yet somewhat soluble, and in order to effectually obviate this objection fluid cosmoline was substituted for the glycerin. The preparation in use at present and for nearly a year past is:

℞.—Sulphite lime, 12 grs.
Acetate morphia, 4 "
Fluid cosmoline, 24 to 30 drops.

Mix well on a slab.

Fluid cosmoline may be advantageously substituted for the glycerin, oil of cloves, carbolic acid, etc., used for saturating cotton canal dressings. Requiring for its evaporation a temperature of over 300° F., and having no affinity for oxygen or moisture, it may be depended on as a *permanent* dressing; and at the same time it is somewhat antiseptic and absolutely non-irritant. And as, in addition to these properties, it readily holds any desired medicament, I consider it, in this connection, as without a rival.

These varied applications of cosmoline seem to constitute a modification of the prevailing dental therapeutics so important as to command the attention of every progressive practitioner.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

The New York Odontological Society held a regular meeting April 15, 1884, at the house of Dr. Wm. H. Dwinelle, No. 15 West Thirty-fourth Street.

The president, Dr. Wm. Jarvie, Jr., in the chair.

Incidents of Office Practice.

Dr. N. W. Kingsley. Dr. Oliver brought me recently a clamp which I think comes as near being universal as anything I have ever seen. I have not had it in use long, and I do not say that it will apply to any tooth, no matter what its shape, but I think that any one who examines carefully this very curious bit of mechanism will come to the conclusion that it must be a very strangely formed tooth that it will not adapt itself to. I picked up in my office this afternoon a very irregularly shaped molar, showing that this clamp is admirably adapted to these peculiar cases. The clamp is made by Dr. J. P. Carmichael.

Dr. Dodge. I want to present a tooth. Once in a while a tooth will do something that we did not expect of it. I have had such a case, which was very curious to me, and I think these two casts will make the matter plain. A clergyman, about forty-six years of age, who was many years ago a patient of mine, but who had slipped away, came in some weeks back to say that he must have his mouth put in better condition. He particularly pointed out the fact that two of the lower incisors, the left central and lateral, shut far up in front of the left upper central. I found that all antagonism had long been lost from the canines back to the wisdom teeth, which had apparently come in pretty well, but never had grown very long, and had not at all sufficed to keep the incisors from grinding each other away; and in that grinding they had developed a very twisted condition. The lower left central and lateral incisors had come out in front of the upper central, and had pushed it back and beveled off the front face, crowding it against the right central. The right upper central had kept outside of the lower incisors, and had been gouged out on the posterior surface, and somewhat shortened. The right upper lateral is wanting; the left upper lateral, in this process, coming against and cutting the lower cuspid, had been beveled off on its mesial side to a large extent, so that it was twisted laterally outwards and away from the median line, and the overlapping was fully as much as one-eighth of an inch. I regret that, not having foreseen what was coming, I did not take and preserve an impression of the lower jaw, so as to show the bite. I concluded that the best course to pursue was to open this mouth, and in order to do that I began by making a lower plate which should cap the lower wisdom teeth with gold caps so swaged and built up as to articulate with the upper wisdom teeth and open the mouth in front. I then went on with various processes of trimming, extending, and repairing these teeth, and getting a better occlusion in the front of the mouth. Just ten days after this plate was put in—and he wore it constantly from that time, so that the interlocking of the front teeth had been prevented for ten days—he came in, and I asked him what had happened to his upper front teeth. He told me he had observed that there was a change there; and the change is shown in this cast. I asked him how long those lower front teeth had been overlapping the left upper central incisor, and he told me it had been a grief to him for at least twenty years, and that nearly as long ago as that he had applied to a dentist in regard to it, and had been discouraged from attempting to do anything in the way of relief; so that for twenty years, or from the age of about twenty-six, the incisor had been holding that unnatural position; and in ten days, without the application of any force, or any expectation on his part or mine that it would come about, it resumed its original place—which fact sheds a melancholy light on the probabilities of retaining-plates. It is the spontaneous traveling of that incisor from the position it had occupied for twenty years to almost its natural position, that I call your attention to as being a curious thing. I never saw anything like it before.

Dr. Woodward. I have two cases of supernumerary teeth that I wish to present. One is that of a young lady, about twenty-one years of age, who came to consult with me about a superior central incisor that has never made its appearance. She informed me that some two years before this a dentist had persuaded her to have the temporary tooth taken out, which was then in pretty good condition. She had the tooth removed, and up to that time the permanent tooth had not made its appearance. The teeth had come together, closing up nearly two-thirds of the space that would be occupied by the central incisor. I instructed her in wedging them apart, and also to use friction on the gum and work upon them as much as she could. In about three months from that time she came in in a great hurry, saying she was on her way to a steamer for Europe. Upon examination, I found that she had wedged the teeth apart, and instead of one tooth, as I expected to find, there were four, peg-shaped in form and entirely separate from each other. You can distinctly see them on this little model that will be passed around.

The next case is that of a boy, about fourteen years of age. Two years ago I extracted his sixth-year molars. In about one year from that time he presented himself, saying that a new tooth was coming. I examined his mouth, and found that in the place where I had extracted the sixth-year molar a supernumerary tooth had made its appearance, which was somewhat smaller than the bicuspids. On the boy's return home, the family physician happened to be present when he told his family about it. The physician said he remembered a case similar to it, and he had no doubt that he could explain it. He said that probably, when the sixth-year molar was extracted, the alveolar process was fractured into one or two pieces, and that from those pieces of the alveolar process a new tooth was formed!

Dr. W. H. Dwinelle. The ignorance of the learned!

Dr. Woodward. I would like to ask Dr. Bogue and Dr. Dwinelle what they would do with the supernumerary tooth in this particular case,—whether it should be extracted or not.

Dr. Dwinelle. I cannot tell on the instant, perhaps. Is it a sound tooth?

Dr. Woodward. It is a sound tooth.

Dr. Dwinelle. Were both sixth-year molars removed?

Dr. Woodward. Both were removed.

Dr. Dwinelle. I think I should let it stand. The case that has been presented by Dr. Dodge, of remarkable progress made in bringing a frontal tooth into its normal position, reminds me of a case I had twenty-five years ago. The lady, about forty-six years of age, had the superior right cuspid out of place, far back in the palatal arch,—so much so as to cause a great deal of irritation to the tongue, and keep her constantly lisping. I had had great success in the use of jack-screws, which I profess to have invented many years ago; I believe I am on record to that effect. I used the jack-screws in this case, and succeeded in bringing the tooth into line in a remarkably short space of time. The case was very remarkable at the time, because it was conceded generally that after a certain age it was not practicable to undertake to remove teeth from their position, especially to any great distance. I certainly succeeded in this case, and the lady is now living.

I have a little incident of practice I would like to present to you. If you profit as much by it as I have already, and hope to prospectively, you will consider it a valuable contribution. It is well known to us all that we have patients whose nervous excitability is wrought up to such a degree that it often approaches the sublime. At times they are beyond their own control. In pursuing our profession we have to combat with difficulties in this direction which cannot be described. They do their best, and we certainly do ours; but oftentimes our best success is the worst kind of a failure, in consequence of the high degree of irritability of the patients, and their inability to control themselves. It is like shooting birds on the wing to approach a tooth or a cavity with instrument or material. We have to dodge and take the chance of hitting or missing the mark, and yet we must proceed. We all have patients of this kind; they are more nervous and sensitive at certain times than at others. I have been successful lately in dealing with this kind of patients by saturating them, so to speak, with morphine and atropine. I give about one-eighth or one-quarter of a grain of morphine, combined with one-sixtieth of a grain of atropine. It is almost comical and amusing to see such patients play so different a part. You never saw two individuals more entirely unlike each other than they are. They present themselves nervous, excitable, almost hysterical; you cannot hit your mark one time in a dozen, perhaps, in your essays to operate; while the other individuality is almost in the condition of a cadaver, and about as easily operated upon. They are sensible—of course you think they are particularly sensible now, because they behave so well; they are sufficiently intelligent, but in a dull state, —seemingly you cannot hurt them. They laugh at you in your efforts to have them respond to your touch. I had a case this day, —a lady of a highly-wrought nervous temperament, heretofore comparatively unmanageable. She has been perfectly charming as a patient. I have had others in the past week; in fact, it is rather a hobby with me, and I am ringing in these old patients that have given me so much unnecessary annoyance. I train them by this new method, and they come into line beautifully, and are now my best patients. The atropine seems to counteract and nullify all the objectionable effects of the morphine, so that this treatment is in no wise injurious. If I give them a couple of doses one day, it is often sufficient to carry them over and through the next. I would recommend this treatment more particularly in cases where we have to operate many hours of each day, as sometimes we are obliged to upon patients who are about to leave for a long time.

Dr. Bogue. I do not know whether the gentlemen understood Dr. Dwinelle. I will ask Dr. Dwinelle how he gives the acetate and morphine.

Dr. Dwinelle. Both together. One seems to modify the other; one seems to counterbalance the objectionable features of the other.

Dr. Bogue. The patient don't get the headache the next day?

Dr. Dwinelle. No, sir. One dose is generally enough, but I have had patients who have taken three doses in twenty-four hours. The effect upon the patient is simply charming.

Dr. Bödecker. Does Dr. Dwinelle use hypodermic injections?

Dr. Dwinelle. No; they take it internally. I suppose a hypodermic application of it would do very well.

Dr. Bödecker. I think it would be more likely to agree with some patients.

Dr. Dwinelle. Very likely. I trust it will be improved upon, as I have no doubt it can be.

Dr. Bödecker. I have some specimens here which were sent me by Dr. Wilhelm Herbst, of Bremen, Germany, who, as many of you know, has of late introduced a new method of inserting gold fillings, by means of a smooth burnisher in the dental engine. This gentleman, as you will observe, obtains beautiful results. I have examined them with the microscope, and found all the edges perfect. In this piece of plaster are inserted three teeth—two bicuspids and one molar. Number 1 is a bicuspid, and contains a gold filling, involving the distal and grinding surfaces; the gold was inserted (as Dr. Herbst claims) in seventeen minutes. Number 2 is also a bicuspid, with a gold filling which involves the mesial, distal, and grinding surfaces of the tooth. The time occupied in packing this cavity is stated to have been thirty-seven minutes. Number 3, a molar, with a large cavity in the mesial and grinding surfaces, was filled with tin in twenty minutes. All cavities have been filled in the position they occupy. This piece of plaster holds three molars, which are all filled with a new amalgam prepared by Dr. Herbst. The fillings in numbers 1 and 2 were inserted by the rotary method. The one marked number 3 was pressed in with ordinary hand instruments. The edges of these fillings are very good, and the adaptation to the walls of the cavity (as can be observed in specimen number 1, which is split) is perfect. Dr. Bronson told me to-night that he for many years had inserted fillings in the same manner.

Dr. Bronson. Not with gold; only amalgam.

J. Smith Dodge, Jr., M.D., D.D.S., then read the following paper on

"THE SPHEROIDAL TENDENCY OF AMALGAM."

This paper will discuss a theoretical explanation of an undoubted fact. The fact is that fillings of amalgam frequently change their shape after they have become solid. The theoretical explanation is that they do this because the amalgam tends to become a sphere.

I do not know when or where this explanation originated, nor have I seen any attempt to prove it. It seems rather to have been thrust into dental literature by simple mention, than to have been emphatically asserted. Probably the theory is an off-hand deduction from familiar facts. When a dentist has put in a broad amalgam filling with a flat surface, and after a while finds the edges drawn in and the surface bulged out, he need not think long to conclude that the amalgam is trying to become a ball. As afterthoughts other considerations may come in, but this is probably the strongest evidence yet presented. This theory I propose to discuss, and perhaps to throw some new light on it. But I do not at all present myself as asserting its truth. There are serious objections to believing that the molecules of so solid a mass as amalgam are subject to the law of readjustment by mutual attraction which draws liquids into the spherical form. Instances of molecular readjustment can be found, and it is patent that, since amalgam does alter its shape, the molecules are somehow free to change their position; but it must weigh heavily against the theory that no other instance (so far as I know, at least) is found in which this process can be demonstrated in a solid. The student of nature's orderly ways becomes very incredulous of "mare's-nests," and asks unusual strength of proof for unparalleled phenomena.

Therefore I expressly disclaim an undoubting belief in this theory; I suspect it will give place to some other less remarkable. I only adopt and present it as a good working hypothesis, and for the following reason: I was led by curiosity to consider the geometry of such a change as the theory suggests, and soon discovered that it involved, as a geometrical necessity, certain definite changes in the form of fillings beyond those usually spoken of as "shrinkage." But to my surprise I found, as my mind dwelt on the subject, that just such changes were known to me, and little by little I was able to gather up from my own knowledge—which, doubtless, does not differ in this from the observations of others—abundant instances of nearly everything which had been geometrically deduced. I have had this matter in mind for perhaps a year, and from increasing observation has come increased certainty that rules can be stated for the formation of amalgam fillings by which the tendency to change of form may be positively utilized, and that these rules are justified by geometrical deductions from the theory before us on the one hand, and by the familiar experience of dentists on the other. Therefore I call this a good working hypothesis, and therefore I ask your attention to the subject.

We will first discuss the geometry of the spheroidal tendency as a matter of pure theory, and afterwards look at the facts of practice. The tendency to a spherical form, as in a drop of mercury, is the result of the mutual attraction of all the molecules, which is most nearly satisfied when they are arranged symmetrically around a center. When the particles are perfectly free to move they will abandon any other arrangement and move—each, of course, as directly as possible—into this. If obstacles interfere, the nearest possible approach will be made to the sphere, with more or less failure to reach it; the governing law being, that at every point the original outline will so change as to approach the outline of a sphere having the same cubical contents.

Fig. 1.

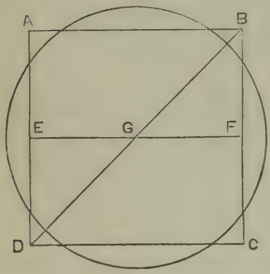
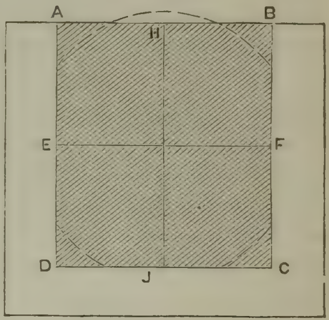


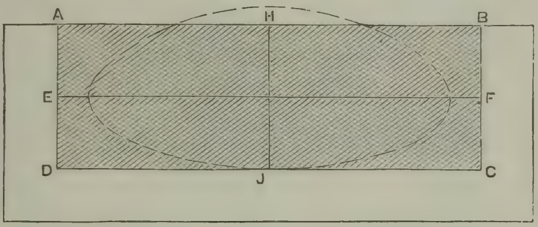
Fig. 2.



Thus, in Fig. 1, if A, B, C, D is a section through the middle of a cube, and this is to change into a sphere of which the circle is a section, G being the center of the mass, not only must the diagonal, B, D, shorten so as to draw the points B and D inward, but of equal necessity the transverse diameter, E, F, must lengthen so as to thrust the points E and F outward. And all intermediate points will move in the one direction or the other, except those which are at the exact distance from the centre required for the sphere. Let it be carefully observed that lengthening of the short diameters is just as much a necessary part of the change as shortening of long ones. From this may be stated the following law, which governs the whole subject: "When an irregular mass tends to assume the spherical form, every point of the surface which is more distant from the geometrical centre of the mass than the radius of a sphere of equal bulk will move toward the centre, and every point less distant will move from the centre." Or, in simpler terms, all long diameters will shorten, and all short ones will lengthen. We may next advance the discussion a step by supposing the mass to be surrounded by an unyielding matrix, except on one side, as in Fig. 2.

Here the matrix makes it impossible for the transverse diameter, E, F, to lengthen. The only effect in this direction will be the closest possible adaptation to the walls at E and F. But the vertical diameter, H, J, can elongate by the pushing outward of the mass at the free surface, H, and this is increased by the contraction of the angles, A, B, C and D, and also by the push against the unyielding wall at J, so that the bulging surface will be the result of both the contraction of long diameters and the expansion of short ones—in a word, the overflow of the readjusted mass. Observe, too, that the mass will be solidly impacted in its matrix, and the sulcus at A and B will be shallowed.

FIG. 3.



Now let us change the proportions of the mass as in Fig. 3.

Here the mass is broad and shallow, and consequently the spheroidal tendency will shorten E, F, and lengthen H, J, with retraction of all the angles. The consequence will be a total departure from the walls; the sulcus at A and B will extend to the bottom of the matrix, and if this is reversed the mass will roll out. Another change of figure will illustrate a different result (Fig. 4).

Here the form is a little more complex, but the same principles are easily applied. The diameter, E, F, will tend to lengthen, and will simply tighten the fit against the walls; H, J will for the same reason tend to shorten, and will draw the projecting edge, A and B, tightly against the borders of the matrix, while the angles, D and C, cannot withdraw from their position because a compensating protrusion of the mass is nowhere possible. Thus it will be seen that precisely the same tendency which in Fig. 3 sets the mass free from its matrix and allows it to drop out will in Fig. 4 tighten its adaptation at every point.

These are theoretical deductions, but I think every dentist has seen their application to practice while I have been speaking. Let me remind you of facts which correspond to these deductions. The bulging surface and the marginal groove are familiar enough, but perhaps it needs a word to remind us that, when this groove is cut out for repair, it is sometimes found shallow, with an excellent adaptation of the amalgam to the walls at a slight depth, while in other cases there is no bottom to the groove until the bottom of the cavity is reached. I think observation will show that in the former case the long diameter of the mass is perpendicular to its surface, so that the filling has swollen laterally, while the other fillings are wider than they are deep, and so have contracted from side to side. These correspond to Figs. 2 and 3. It must also have been noticed that large fillings, which go deeply into the tooth, and are freely built out to contour, afford the most perfect edges. Indeed, I have seen many, even in past years when less perfect amalgam was used, that were remarkable for their exactness, and I have seen some in which thin edges of enamel had been crushed in. This is explained by Fig. 4. The contoured part of the filling is drawn in against the edges. Again, in approximal fillings of moderate size, which admit of no great depth, it is sometimes found that the adaptation is very good, while in other cases such fillings unaccountably drop out. I think it will be found that those which fail are of an oblong shape, and have been fastened by slight undercuts at the ends of the long diameter, so that in shortening and thickening they have lost their hold, while similar fillings will hold perfectly if fastened by undercuts at the sides—that is to say, at the extremities of the short diameter, which will tend to lengthen.

Fig. 4.

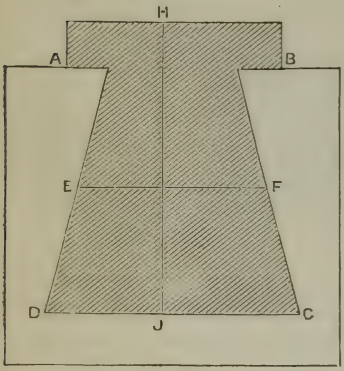


Fig. 5.

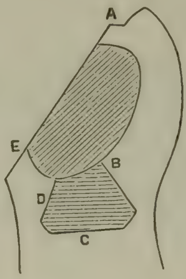
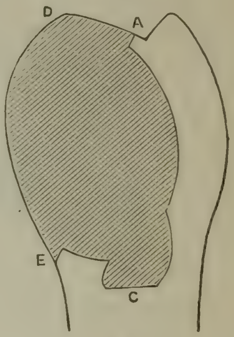


Fig. 6.



I do not propose to give any detailed rules for applying what has been stated above, but only some suggestions. The governing principle is, that the original form of the mass of amalgam determines the changes which will take place in its parts; and by remembering that long diameters will shorten and short ones lengthen, the dentist can frequently control the result by varying the form of the cavity and filling. Let me illustrate this by a single case, treated in two ways, which will make the matter so plain that it may fitly terminate this paper.

Suppose Fig. 5 to show a longitudinal section of a molar, filled into the pulp-chamber from an approximal cavity, the walls of which have been freely beveled at A, E. A, B, D, E is amalgam, and B, C, D is zinc-phosphate in the pulp-chamber. Now, if the amalgam used has much spheroidal tendency, it will shorten in the direction A, E, and draw out of the undercut which holds it, while it will lengthen in the opposite direction and bulge out of the cavity. The fit will be lost and decay will soon recur. But let us fill it differently, as in Fig. 6.

The pulp-chamber is now made part of the cavity, and the amalgam carried into it, while the mass is freely contoured, A, D, E. The result now is that A, E is a short diameter, and will tend to increase, and so tighten the fit, while D, C, being a long diameter, will try to shorten, and so will keep the borders, A and E, as tight as they were at first.

It only remains to say, as at first, that I am not trying to prove the spheroidal theory, but only to use it as a means of impressing and explaining certain practical hints which I believe to be valuable. Undoubtedly the experimental confirmation in practice of these theoretical deductions goes far to prove the theory true. To me they give it great interest, and I trust the members of the Odontological Society may think the matter worth further reflection and examination.

Discussion.

Dr. Bogue. I made some investigations, years ago, in the matter of amalgam fillings, but have made none recently. In my ignorance I have perhaps builded better than I knew, for since our meeting at Dr. Crosby's church, some years ago, which most of you will remember, I have been a good deal in the habit of using platinum rings, which have been exhibited before this society, to surround a tooth, and then malleting in my fillings—in a great many cases obtaining the results that Dr. Dodge has so graphically shown us. I make my acknowledgments to him for an explanation of some of the phenomena which we have all observed. The only objection I see thus far is that, with two exceptions, all the amalgams that I have tested eventually shrink.

Dr. Dodge. In all directions?

Dr. Bogue. I have only tested them longitudinally. They all shrink longitudinally, with two exceptions; and those two exceptions are copper and palladium. I do not know but there may be others that do not shrink, but I have not measured any others that do not.

Dr. Dodge. My opinion is that the elaborate experiments that have been made in regard to the shrinkage of amalgams have hardly been in the right direction, in view especially of a theory like this. They have tested with very ingenious, accurate, and costly instruments the shrinkage or non-shrinkage of masses of amalgam on one line. It is indisputable that if amalgam shrinks the mass grows smaller; and a simple way of determining the shrinkage of a mass of amalgam would be to see how much water it would displace before and after shrinkage, on the principle of the operation for determining how much rubber you want to put into a rubber set, by placing the wax in a tumbler of water and seeing how much water it will displace. In this way you could see whether the shrinkage was merely a change of form in some direction, compensated by an enlargement in another. It strikes me that this would be a much easier way of determining the question of the absolute shrinkage of an amalgam than to examine it with a microscope, or to go through any of the costly processes which have been so admirably conducted, but which, after all, only give one measurement, and do not measure the bulk of the mass.

Dr. Bogue. I believe Mr. Charles Tomes made some specific-gravity tests, which he conducted very much after the fashion that Dr. Dodge has indicated, but whether the results are recorded or not I do not know.

Dr. Clowes. Having had so little to say about amalgam of late, I am quite out of practice in speaking of it; but as my acquaintance with it dates far back, I would hardly feel excused should I remain silent now. The spheroidal tendencies of amalgam, so plausibly presented and ingeniously discussed in the essay of this evening, have practically no existence. The expansions and contractions of amalgam are, and probably always will be, mooted questions in this profession. My personal experience with a good dental amalgam is that it neither contracts nor expands, except *pari passu* with the substance of the tooth, and that its mission is always a saving one. There are amalgams, unworthy of the name, which only work mischief, and especially those having cadmium in their composition. Precipitated silver is also a very inferior base for a good filling. I have used amalgam for forty years, and used it when to do so required a heroism of which the present generation of dentists knows nothing. During all that time spheroidal tendencies gave me no trouble. The original amalgam of coin filings and mercury annoyed me exceedingly by its proclivity for darkness and for darkening its surroundings. I longed to change this for the better, and by accident, as it were, blundered upon improvement. It happend in this way: Two large approximal cavities (the one in front of a molar, and the other in the rear of a contiguous bicuspid) needed filling. My habit was in such cases to fill the cavity fronting with tin; the one opposite with amalgam; and I generally performed the operations at different times, for fear of getting things mixed. But on one occasion I ventured upon both at the same sitting. The mixing took place, and I supposed the fillings were spoiled. When the patient came again my astonishment was equal to my delight in looking for the first time upon the silvery-white face of an amalgam filling! While dressing its surface another excellence appeared in its increased malleability. Thus, about 1845, the two most important qualities belonging to our present amalgams came to my knowledge and entered into my fillings in the form of tin-foil, until similar results were obtained by the fire, the flux, and the crucible of Hunter.

Dr. Jarvie. Did they shrink before you used any tin?

Dr. Clowes. I do not recollect any trouble from shrinking before that time. The original black fillings were not handsome, but they were true; and if not fair to look upon, were saving and healthful in their influence upon the perishing shells, which they strengthened and maintained through many years.

Dr. J. F. P. Hodson. The long and short diameter of amalgam fillings presented to us this evening constitute rather a new phase of the subject—at least it is so to me; and, when Dr. Dodge asks us whether we have observed this tendency of long diameters to shorten and short ones to lengthen, we don't knew whether we have or not. If we have not had these things in mind, we are not able to say that it is because of long and short diameter that we have gotten these results, which we have heretofore considered due to shrinkage. I want to look into it, and shall be glad to observe the operation of this principle in the cases I deal with hereafter. I want to mention that some time ago I made a suggestion of a method I had used for many years, which is this: When I pack a large mass of amalgam I take some already set from a previous mixing, that I had used days or weeks before, and place it in the centre of the new amalgam stopping. I felt that if there was any shrinkage I was gaining largely by putting in some that was already a solid mass. I must say that I have had good results from it.

Whether or not it was a mere fancy of mine, and I was "building better than I knew," in view of this theory, it is a certain fact that I did get good results from that method.

Dr. Lord. I should think there was very great interest in this paper, perhaps for several reasons—one, at least, that has just been alluded to by a speaker. The subject has been presented to us in a somewhat new light, and it will set us to thinking. It may be that the views presented will more or less explain some of my experiences, which I have not been quite able to understand. These were that the fillings made of the same alloy, used in the same mouth, prepared in the same way, with equal care, have not done equally well. It may be owing to the shape of the cavity, which did not occur to me. I cannot say, as has been said by one of the speakers, that amalgam fillings do just what I want and expect them to do; nor have I seen such uniform results from the hands of others. I do not believe that amalgam will always prevent further decay, and there are good and sufficient reasons why it will not. It appears to do much better in some classes of teeth and in some mouths than in others; just the precise or definite reason why I am unable to give. If the success must depend upon the shape or depth of the cavity, another argument is given against its general use, as we cannot always control these conditions. I wish to say that it is my experience and my judgment that we ought not to use amalgam when we can use foils, either gold or tin, with a good degree of certainty. It is not equal to tin, if, indeed, anything else is. But the conditions are not infrequently such that we can do better, or the best, with a plastic material, and of course in such cases it should be used. There is unquestionably a great difference in the quality of the various alloys. Some will oxidize and shrink more than others. It may be that we have sometimes charged failures to the particular alloy, or the manner in which it was used, when it may have been the shape of the cavity; and the paper we have had the pleasure of listening to this evening will undoubtedly lead us to be more observing upon the subject.

Dr. C. E. Francis. I have been very much interested in Dr. Dodge's paper, and think the views he has advanced are well worthy our consideration. Amalgam has always been a mystery to me. When I first commenced practice I was much prejudiced against it, but during my life of observation I have been afraid of amalgam simply for one reason; not from fear of any mercurial action upon the system, nor from its color, but from this change of shape which has been alluded to. I have many times heard it stated that amalgam would "shrink," also that it would "expand," and it has been a question all through as to whether amalgam would shrink or expand, but that it does undergo changes of shape in many cases every man in this room must know. We have all seen it over and over again. Dr. Dodge called my attention to this theory some months ago, and I was so much impressed with it that I requested him to bring the subject before the Odontological Society. Dr. Dodge has been kind enough to do this, and it certainly will give us something to think about.

Dr. F. Y. Clark. I fail to agree with everything that has been said in regard to amalgam. I have been using it now and then for a long time; but as it is ordinarily employed, owing to shrinkage and bulging, I don't think it ought to be considered a permanent or reliable filling. Within the last two years I have adopted a method which I think overcomes, to a very considerable extent, the objections mentioned—sufficiently, at least, to offer much encouragement. The plan consists of mixing any ordinary amalgam with oxy-phosphate cement—about one-third of the former to two-thirds of the latter. The rubber-dam should be adjusted on the tooth, the cavity dried out, and all in readiness. Then the amalgam should be prepared in the usual way, and thoroughly mixed with the oxyphosphate, and with suitable instruments, when about the consistence of putty, it should be placed into the cavity. When it has set sufficiently to bear trimming, the outer surface should be removed just below the marginal wall of the cavity, and replaced with amalgam alone. This capping or protecting surface filling should be composed of the best unchangeable amalgam that can be had, and it should be burnished against the main filling a little at a time, until a sure union is established. Where there is no anchorage or undercutting, it is perhaps better to have a little more amalgam in the oxyphosphate or main filling, so that the surface filling will more readily unite. I consider it better to delay the last polishing or finishing a few days until the amalgam is sufficiently hard. So far as I have seen, these fillings look well; there is no appearance of shrinkage or bulging, and I feel much encouraged with results so far. Dr. Kingsley, who is present, will no doubt remember my calling his attention to the combination of oxyphosphate and amalgam some years ago, while on a trip up the Hudson. My attention was first called to it as a filling by Dr. Samuel A. White, of Savannah, Ga. But on trial it was found to wash and waste away, which led to the practice of capping the surface as described. As I said before, the surface filling should be made from the best amalgam that can be had.

President Jarvie. How do you mix it?

Dr. Clark. I prepare the amalgam first just the same as if it was to be used alone in the usual way; then place it on a glass slab along with the oxyphosphate; then add the cement liquid, and with a stiff spatula thoroughly incorporate the mass until it assumes a grayish color, and is about the consistence of putty; then place it in the cavity. When covered, protected, and united with amalgam, as proposed, so far as I have seen it acts admirably.

Dr. Lord. May I ask Dr. Clark if the mass retains the color of the amalgam?

Dr. Clark. The main filling does not show at all. It is entirely covered and protected by the capping, which is nothing but amalgam. It is very important, as will be readily seen, that the main filling be excluded from the fluids of the mouth. I have been using amalgam now and then for over thirty years, and have frequently noticed its action as described by Dr. Dodge, but never before understood the governing laws.

Dr. C. E. Francis. A few years ago a dentist of South Carolina, Dr. Wright, suggested the idea of combining oxychloride of zinc with amalgam. His method was to prepare the amalgam as for a filling, and triturate it in a mortar with oxide of zinc; then add chloride of zinc, or the liquid, and mix on a glass plate with a spatula. I tried it several times myself, and it makes a very nice filling. I think this was about seven or more years ago.

Dr. Bogue. I suppose that if there is any object in our meeting together here and in similar societies, apart from mere sociability and the pleasure of associating with a lot of good fellows, it is to learn; and I must confess my disappointment that every now and again I hear gentlemen in the New York Odontological Society speak of squeezing their amalgam. I am not surprised that any gentleman who manipulates his amalgam in that way should find it utterly unreliable stuff, as we have heard it characterized. It is not much more than a month since one of my professional brethren said to me, "What do you mean by weighing the component parts of your amalgam? You do not stop to weigh them always, do you?" "Yes." "Why, I could not spend the time; how do you do it?" "Have you never heard of Fletcher's balance?" "No, I never heard of it." Now, I supposed that every gentleman in this society knew a Fletcher's balance as well as I know a water-jug. This gentleman did not. I showed him how to put the mercury into one cup, and the alloy into the other cup, enough to balance it. He acknowledged it was a good plan. I frequently see that the names of gentlemen belonging to the Odontological Society are given to the manufacturers of amalgams, and other materials as well, certifying that "Your amalgam," or your something else, "is the best that I have ever used." Either that means something or it means nothing. If a gentleman signing such a certificate as that has carefully gone over the experiments that others have gone over, and has tested those amalgams by mechanical and chemical tests, and by specific gravity, and knows whereof he affirms, that recommendation ought to be most valuable; but if he merely guesses, and tells of some fillings that he has seen that he guesses have been in six months, or guesses have been in six years, and says they look well, and he has never known any to fail; if he rubs the amalgam in his hand, and says, "Yes, I will give you a certificate," it does not show that in this "district school" we are learning a great deal. If the president will permit me, I will make a little confession. For a dozen years, as one of Dr. Westcott's students, I did not use amalgam, and it was not until I was driven to it by the necessities of the case of a young lady whose tooth was so frail that I thought it would not stand a gold filling, and so sensitive that she almost declined to be touched, that I was compelled to use it for the first time. I went to my neighbor, Dr. Cook, and asked him how to put in an amalgam filling. The last I heard of it that filling was still standing, although it comprised almost as much in bulk as the tooth would stand and remain in the mouth. I could not help keeping that filling in my mind's eye as I listened to Dr. Dodge's paper, and I find a reasonable explanation of why that filling, in a frail, sensitive tooth, stood, when other fillings, put in by myself and other operators that I have depended upon, have failed. After getting to that point of necessity I found that I must use amalgam or be dishonest; and then I found that I must investigate somewhat as to its properties or be dishonest. I made investigations that took a year of time and a good deal of money. They taught me that amalgams should not be washed, but should be mixed quite dry; and that the amalgam should be as thoroughly set as may be before the patient leaves my office, so as not to be subjected to changes of form toward the spheroidal in the future. My investigations taught me, moreover, that amalgams should, if possible, be made of a single metal amalgamated with mercury, and that, if I wanted a white surface, tin should be put upon the surface. Gentlemen talk about amalgams as though they were all comprised under one head; but they are far from it. Palladium is a true chemical compound with mercury, and so intense is its action that if it is mixed in a certain proportion it will explode upon your table, as I have had it do. Copper with mercury is probably a true chemical alloy. That is the substance in Sullivan's amalgam. Those two are but single simple metals amalgamated with mercury, and with no other alloy put with them. Those two do not change in form or bulk; those two do not discolor the teeth, and no crevices are found around them if the cavities are properly excavated; but both become as black as your hat. Once you leave those and go into compound alloys, there seems to be no certainty. You have good, bad, and indifferent. Yet I notice that the term amalgam is used as though it indicated but a single substance, the properties of which were well understood. I beg the pardon of the president, and of my brethren here present, for indulging in this kind of a talk, but it seemed hardly proper to allow some of the allusions made this evening to pass unchallenged.

Dr. Northrop. May I ask the gentleman whom he considers capable or competent to give a letter of recommendation for an amalgam. As for myself, I believe I never gave such a letter; but when such a man as Dr. Flagg comes before us and claims that the best chemists and the best experts in Philadelphia have tested and passed favorably upon an amalgam, we ought to have something we can rely upon.

Dr. Bogue. If the gentleman will inform me what physician is capable of diagnosing a case of difficult and irregular dentition, and treating it as it is proper to treat it, I will most cheerfully answer his question; or if he will tell us what medical school will instruct us as to oral and dental surgery, I shall be delighted to answer his question. Until then I cannot. I do not think that he or I would dare give such a letter.

Dr. Lord. I think I said that amalgam did better in some classes of teeth than in others, and I said that in teeth of soft structure it did not do as well. I shall have to qualify that somewhat. Sometimes it does. One of the speakers said that amalgam was a mystery; and I was sorry I had not thought of that word, because it just meets the case. It is a mystery. There is a mystery there somewhere, for amalgam does not meet the case always; and, as I said, it don't meet the case equally well in the same mouth, when put in with the same care and under the same conditions and circumstances, and it may be due to the shape of the cavity.

Dr. Bogue. The same kind of amalgam?

Dr. Lord. The same kind of amalgam; the same kind of alloy.

President Jarvie. I hope this paper will set us to thinking a little. It is nothing new for us to hear about the spheroidal tendency of amalgam, or the tendency to a ball-shape; and we have heard many times how desirable it is to form cavities to be filled with amalgam, so that the plug will be as near ball-shaped as possible. When long and narrow cavities are to be filled with amalgam, I think you will find that the plugs will change their shape; and whether it is on account of the long diameter shortening, and the short diameter lengthening, is something that would be well for us to consider and think over. Possibly this paper of Dr. Dodge will result in something that will answer the conundrum as to why it is that, in the same mouth and apparently under the same conditions, of two plugs, both made from the same mass, one will retain its form and preserve the tooth perfectly, while in the other there appears to be a shrinkage or change of form which causes a space between the plug and the walls of the cavity.

Adjourned.

E. T. Payne, *Secretary.*

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The First District Dental Society of the State of New York held a regular meeting on Tuesday, December 4, 1883.

Dr. E. Parmly Brown, of Flushing, L. I., read a paper, of which the following is an abstract, on

"The Crowning of Tooth-Roots."

The subject of the crowning of natural tooth-roots is one of the most important and interesting problems in process of solution by the dental profession.

We are just recovering from the shock of having laid away in the cold ground a martyr to his enthusiasm in noble attemps to save the wrecks of pulpless teeth; and, in such an heroic endeavor, days of labor and books of foil were frequently expended in restoring the contour of an almost crownless tooth, which thus became a monument to his delicate and persevering skill in thoroughly impacting gold on so frail a sub-structure. Good shall surely come from emulation of his honorable self-sacrifice, but few operators may attain equal expertness, and each must decide for himself the question of spending so much time and money upon such vanishing organs.

Experience has shown that, in the extensive gold restoration of dead teeth,—especially the back teeth of average mouths,—the work, even when beautifully done in teeth of the best structure, is "like the house built upon the sand." Not that the gold was not strong, nor well anchored, nor good at the margins, but that there was a lack of tooth-substance to which the gold could be permanently fixed. The remaining portions of the structure, through its canaliculi and fibrillæ, more or less devoid of living matter, are ever inviting, by absorption, the elements of destruction.

A better method, which may be employed by the average dentist, and which is especially applicable to molars and bicuspids, consists in hermetically sealing every exposed portion of the tooth within a cap-crown. For example, Figure 1 shows a molar cap-crown, or thimble, made of gold-plate, suitably shaped and polished. Figure 2 represents a perforated platinum band, or ferrule, made to fit around the neck of the tooth or roots, as seen in Figure 3. In this instance two headed pins have been fixed in the roots, and the band is attached by means of amalgam, covering the root-surface around the pins, and filling the inwardly-burred perforations to near the edge of the band, thus insuring the perfect protection of the root-end, and a moisture-tight joining of the band to the neck. Figure 4 shows the cap-crown filled with thin white cement, and pressed into place, completing the operation.

Fig. 1.

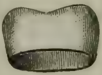


Fig. 2.

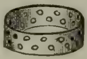


Fig. 3.

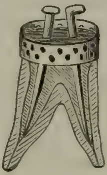
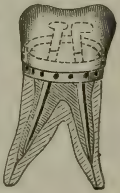


Fig. 4.



This strong, artistic crown is simple in construction and application, and so inspires the operator with confidence in its durability that he is encouraged to ask the fair remuneration which is cheerfully paid by the discerning and appreciative patient.

Crowns for the ten anterior teeth should be constructed with porcelain faces to imitate nature, and I now offer for the consideration of the profession my patented system of crowning all such teeth or roots, with or without living pulps, when in need of repair, and this system is described as follows:

Fig. 5.

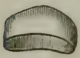


Fig. 6.

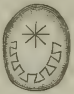


Fig. 7.

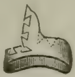


Fig. 8.

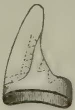


Fig. 9.

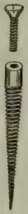


Fig. 10.

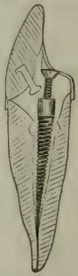


Figure 5 represents a single piece of platinum plate swaged into a cap-like form, ready to be cut as shown in figure 6, to be partially raised in leaf form as seen in Figure 7. The object of the jagged or dovetailed edges of the leaf and ferrule is shown in Figure 8, where the porcelain is attached by means of those edges, which are baked into it in the process of manufacture. The radial points seen in Figure 6 are bent inward to become imbedded in the amalgam filling, which may be packed through the hole thus made in the backing. Figure 9 shows a double screw which fastens the crown in position when set, the small screw entering the root-screw after the crown is adjusted with the amalgam. Figure 10 is a sectional view of the crown attached to the root, and shows the metal screw inserted well into the pulp canal, and also imbedded in the amalgam within the shell of the crown. A small double-headed pin is shown entering the amalgam from the percelain face where the porcelain is not weakened by its presence.

Incidents of Practice.

Dr. F. H. Lee. A gentleman, sixty-two years of age, came to me about a month ago. He had been under treatment about twelve months for a swelling on the left side of the lower jaw, which was painful, kept him from business, and caused him a great deal of trouble. He had been in the hands of three or four physicians, one dentist, and one magnetic physician, none of whom had been able to find out what the trouble was, or to remove it. The jaws were set tightly together, and the only access to the mouth was where the bicuspids and molars had been extracted. By passing a probe down beneath the gum, by the side of the condyle, about half an inch, I found imbedded in the jaw beneath the gum what I supposed to be a wisdom tooth. I consulted Dr. Abbott, and he coincided in my diagnosis. I then made an incision about an inch and a half long, and packed in carbolated cotton every day, to obtain space, and syringed it out with carbolic acid water and glycerin. By laying the gum aside I could see a large wisdom tooth pointing toward the tongue. After about three weeks' treatment I sent him down to Dr. Hasbrouck to have the tooth extracted, which was done with much difficulty. It proved to be a case of exostosis. The patient is now nearly well, and the jaws are open to the normal width.

Dr. Gibson. I had a similar case occurring on the left side. The abscess was, I think, underneath the first or second bicuspid. I passed the probe down underneath the jaw on the outside. The patient was sent down to Dr. Hasbrouck to have the tooth extracted, and recovered without further treatment. The tooth was nearly erupted, and had pitched forward so as to impinge against the palatal wall. The patient was a man of thirty-five or forty years of age.

Dr. La Roche. I have had a patient going on three years who has had a great deal of trouble with wisdom teeth. When I first spoke of it here I was not prepared to give the full history and treatment of the case, because I had one wisdom tooth yet to take out, and which I finally extracted last June. The gentleman is very nervous, and is a mere skeleton from the suffering caused by these retarded wisdom teeth during the last five years. He went into the country last July for two months, being then in a very comfortable condition. After this last wisdom tooth was taken out the parts did not seem to heal in a proper manner. There was a cicatrix that required to be opened again. I had been trying to get the tooth out for about four months. I would like the gentlemen to look at this last tooth that I extracted. I could not see it, but could only feel it with an instrument.

Dr. Clowes. I have had a wisdom-tooth case lately that has caused a good deal of pain and given considerable trouble. The two molars in front of it were extracted, but still this wisdom tooth caused constant pain. I finally sent the lady down to Dr. Hasbrouck, when the tooth was extracted, and the roots were found to be exostosed, thus accounting for the pain. The wound left by its extraction is healing gradually, and I think that in the course of a couple of weeks it will be well.

Dr. W. H. Atkinson. I have a very instructive case, that shows us the importance of understanding the timber we are working in. A girl, a little over seven years of age, had her right inferior lateral incisor removed, and the right inferior second molar filled. Subsequently pain ensued, and, in attempting to find the dentist who filled the tooth, the person in charge of the child was directed to some one up on Twenty-third street, who gave her gas and extracted the teeth which were supposed to be the source of the mischief,—the right inferior temporary molar and the cuspid. After this operation the pain became very much worse, and they sent for a physician, who attended the child about a week, and then determined to open the swelling under the chin. A lady who took some interest in the child being present, advised them not to allow any cutting by the physician until such time as a certain person should be consulted respecting the case.

The father of the child brought her to me on Saturday a week ago, about 12 o'clock, and a more untoward case I never saw of an overworked nervous system. The child was cadaverous-looking. There was a large swelling with a brownish surface all over the protruding part of the enlargement under the chin. I found the gum and periosteum sloughed off from the central incisor. The physician had advised extraction because it was loose. The root was only partly developed. Back to the first permanent molar, which was standing and very loose, the bone was exposed. I carefully dried out the cavity with bibulous paper, and removed the débris; then filled a syringe with aromatic sulphuric acid and applied it, repeating it several times. I then took about one-sixth of a yard of medium rubber cloth and cut it long enough to make a bandage to go over the face; folded and fastened it over the swollen portion, and ordered a pack of ice to be applied to the surface. On Sunday she came, and I found contraction had taken place at the site of the socket where the second permanent incisor had been removed, and up to the site of the cuspid. I found that the continued pressure of the rubber had very much reduced the swelling, and that the fluctuation was very much less; that in front there was no discharge of pus at all, and in no place where the aromatic sulphuric acid had cooked the surface was there any discharge. But the acid had not gone to the full depth of the trouble. I repeated the same kind of dressing as before, and sent the child away. She came on Monday, and then there was no discharge except from the outer wall, far back. I was afraid the trouble would involve the cyst of the permanent bicuspid. I dressed that portion of it again with aromatic sulphuric acid, and then dressed the remaining portion with peroxide of hydrogen. I have dressed it every day since with peroxide of hydrogen, and no more pus has shown itself except at the outer wall. The tissues are closed up as far as the site of the socket of the first temporary molar root, and on the inside, up nearly to the margin of the alveolus, there has been a re-attachment of the soft parts. Another important thing in the treatment is that I put the child upon sulphate of cinchonidia, giving two grains three times a day, and ordered milk and egg punch, and as much soft food as she could take. She took very little the first day. On Tuesday she began to be playful.

The lesson this case teaches me is this: that it is well for us to proceed cautiously. The debility of the child made it doubtful as to how far the blood had been arrested in its circulation, or how far resuscitation was possible. If that child had been an adult, and I had seen the case the same length of time after the extraction of the teeth, I should have burred out the transverse process and the inner and outer processes as far as they usually are absorbed, and made it a simple wound. But the child was already blood-poisoned, so that I felt that it was necessary to support it with tonic treatment in order to get the case under control.

Dr. ——. What was the cause of the necrosis in this case?

Dr. Atkinson. I think it was caused by the shock of extraction. I do not think there was any excuse for extracting more than one tooth—the second molar. It was downright malpractice, or, in other words, ignorance. At that age the sockets of those temporary teeth were not absorbed. My great fear was that the interstitial cysts in which the bicuspids are growing would be involved; that is my fear now. There was a little pocket behind, which I filled with dry cotton, so as to be sure to get it in the track of the pus, so that drainage could be effected by pressure of the rubber cloth. On Wednesday I ordered the cold appplications taken away, because the inflammatory stage was entirely overcome, and that was the object of lowering the temperature of the parts. I propose to make one operation for the removal of the dead bone. For an adult I would not care how many operations I made for that purpose; but in the case of children you must not alarm them much; and it is better to make one operation in removing dead bone with the bur than to make more.

The society then adjourned.

James E. Dexter, M. D. S., *Secretary.*

Clinic.

A gentleman (sent by Dr. Andrews) appeared at the clinic having a large sarcomatous tumor on the left side of the face, extending from the site of the superior cuspid back to the tubercle of the jaw, and involving the antrum and the gum-tissue. It was of about two months' growth, lobulated, and of a tomato-like appearance. Dr. Atkinson said it appeared to be of a malignant character, but the degree of malignancy was undetermined. He advised its extirpation.

Dr. Dwight Smith exhibited a lilliputian tooth, about one-sixth the ordinary size, and well formed.

Dr. S. C. G. Watkins, of Mont Clair, N. J., exhibited a model of a cleft palate, the deformity being congenital. Treatment not yet begun. The patient is a man about thirty years of age.

Dr. E. Parmly Brown exhibited his new crown, which was described in full at the evening meeting, same day (see page 405).

Dr. Rynear set one of his tooth crowns. (See report of November clinic in the June number of the Dental Cosmos).

Dr. G. S. Meigs presented a case of necrosis, and Dr. J. H. Meyer showed models of irregularity. Dr. W. E. Truax, of Freehold, N. J., also showed models of irregularity.

Dr. Roy presented a case of retarded dentition. Extraction of temporary tooth was advised.

Dr. Harvey Iredell, of New Brunswick, N. J., exhibited a switchboard for controlling the force of the electric mallet by switching off some of the cells of the battery; also for economising the battery.

Dr. Charles Hubbard, of Brooklyn, exhibited two teeth, apparently laterals, the roots of which had fused together.

Dr. J. A. Bishop presented a case of fracture of the lower jaw, which was partly described in the report of the November clinic. (See June number of the Dental Cosmos.) He further said in relation to the case: "The jaw was broken on the 17th of September, and the splint was applied on the 29th of September. It was taken off frequently during the first thirty days, to show the fracture to students and to remove the necrosed bone. The opening under the chin is still discharging, although no fragments of bone have been removed since October. The swelling on the inside of the mouth is nearly gone, and the loosened incisors are growing firm. The hardening at the point of union is progressing satisfactorily. The difficulty in the bite, the meeting of the upper and lower back teeth, is probably due to injury to the capsular ligaments which cover the condyles, and it is believed that the front teeth will close firmly in three or four months. This case is a complete demonstration that an interdental splint covering the teeth of the lower jaw will hold the fragments in place when the fracture is near the canine, without external appliances; in fact, it will do this in nearly all cases, even when the fracture is as far back as the first permanent molar. This important feature was first demonstrated in a patient in Bellevue Hospital, whose jaw was broken in December, 1863."

The society held a regular meeting Tuesday, February 5, 1884, the president, Dr. A. L. Northrop, in the chair.

Dr. N. W. Kingsley called the attention of the society to rumors that certain patents had been obtained by Dr. C. M. Richmond, covering the artificial crown called the "Richmond crown," and that the present owner or owners of those patents threatened legal proceedings against any dentists using said crowns without license. He desired to know if any one present could give any exact information as to these circumstances.

The President. Some time since a Mr. Gordon, whom I understand to be a lawyer employed by Dr. Richmond, made a statement to me in regard to those patents, similar to what Dr. Kingsley has just said; and added that, though the patents ought not to be good for anything, yet, if their holder can collect license fees from a few dentists throughout the country, that fact will give him legal status sufficient perhaps to give trouble to many others. I will call upon Dr. C. M. Richmond's brother, Dr. A. S. Richmond, to give the desired information.

Dr. A. S. Richmond stated that on the 12th day of August, 1878, his brother, C. M. Richmond, arrived in Chicago from San Francisco, for the purpose of demonstrating what he called his porcelain face and gold crowns to the dental profession. He was there a number of weeks, and during that time he gave clinics in a number of dental offices in that city. His circulars at that time stated that all he would charge was for clinics, his fee being fifteen or twenty dollars each. After staying in Chicago until September 27, he went to Milwaukee and gave clinics. From there he went to St. Paul, and from there to Minneapolis. He then returned to Chicago. From there he went to Detroit, Cleveland, and to New York. On the 23d day of September, 1878, I left Chicago for the purpose of instructing dentists in regard to this crown, and went to Indianapolis, Columbus, and Toledo, O., Pittsburg, Washington, and Baltimore, giving clinics in each of these cities. While I was in Cincinnati Dr. Jonathan Taft published an editorial about these crowns, which will be found in the *Dental Register* for November. Returning from Washington, I stopped in Baltimore for two months, giving a clinic before the Baltimore Dental College, under the supervision of Dr. Gorgas, which was reported in the *American Journal of Dental Science* for January, 1879. I went to Philadelphia, and gave clinics in several offices there. I came from there to New York, where I met my brother, who was giving clinics to members of the dental profession. On the 20th day of February, 1879, I went to Albany; thence to Troy, Toledo, Fort Wayne, Lafayette, and St. Louis, where I met Dr. James E. Low, of Chicago, who had attended a clinic that my brother gave in that city, where there were six others present. Dr. Low thought he had something new in bridge-work, which was in fact the invention of Dr. Lorenze, of Chicago. I then went to Chicago and formed a partnership, first with Dr. Herriott, and subsequently with Dr. Cleveland. During this time I was doing this special crown work for the dentists in Chicago, and could name fifty of them for whom I worked. In April my brother, who had formed a partnership with Dr. L. T. Sheffield, in New York, wrote that he would like to have me give up my business in Chicago and come here. I came here on the 12th of May. They had then rented offices at No. 26 West Thirty-second street. I staid a few days, and went back to Chicago. On the 10th of August I received a telegram from my brother, desiring me to come to New York and stay a couple of months, as he and Dr. Sheffield had gone to New London to practice. I arrived here on the 13th day of August, 1881, and took entire charge of their office. My brother finally made up his mind to have nothing more to do with Dr. Sheffield. Up to this time he had never applied for but one patent, a porcelain crown, with screw and tube, issued February 10, 1880. After this date a number of patents were applied for and granted. My brother states that he signed the application papers without looking at them for eleven different patents. He went before the United States Court in this city and acknowledged perjury. He is out of the United States and cannot be reached. I have been enjoined by the United States

Supreme Court from practicing any of these specialties for which patents were obtained in this manner. In my answer, put in last month, before the United States Circuit Court, are the facts from beginning to end of this business, upon which proper steps can be taken to have all of those patents invalidated, upon evidence I have produced within the last sixty days.

Dr. Wm. H. Atkinson then read the following paper on

"LOOSE TEETH."

Let us begin by suggesting the basis upon which a diagnosis should depend. Arrest of nutrient activity is the result of mechanical pressure or deprivation of nerve current presiding over vascular current. The inception of loose teeth has been stated as softening of their supports. This leads to the query, What are these supports? In a general way the bony sockets and the soft parts covering them may be said to answer the question. The only sign of this condition (of loose teeth) is lack of normal feeling, soon verging into a slight elongation or loosening of the tooth or teeth involved, with uneasiness, instigating the desire to bite, or press the teeth into the socket. This is hardly ever unpleasant to the patient at this point, but soon the itching becomes irritating, and then slightly painful, increasing according to the constitutional make-up of the patient, more or less rapidly, until it can no longer be borne. Now advice is sought, and results obtained in accordance with the intelligence and persistence of patient and practitioner. Let us examine into the character of the gum, periosteum, and bony processes in which the teeth are held. They are called soft and hard supports, but are all nourished and maintained in functioning condition by a fluid pabulum derived from the blood-vessels and nerves. Anything that interferes with the regularity of this supply may be the inception of retrogressive movement in the pabulum, blood, and nerve currents, upon which the nutrition depends.

There are three principal antecedents to the softening process. Two are systemic, and one is local. Disuse of the masticatory apparatus and constitutional debility or blood discrasia are the first two, and want of cleanliness the other. It will be better to examine the last first, for the reason that it is the simplest, and least likely to attract attention, and therefore most liable to be well advanced before any attempt is made for its correction. Want of cleanliness is usually the sequent of disuse, in some measure, of mastication. This is induced in civilized communities by gulping soft, mushy, and pulpous articles of diet without thorough insalivation, thus initiating imperfection in the digestion of the food, which lays the foundation for imperfectly elaborated blood, from which the pabulum is derived which supports the tissues. This incomplete churning together of the diverse articles of food produces the state of the blood known as cachexia, discrasia, etc., and means poor, bad blood mixture. This is an obscure and complicated subject, and to be comprehended requires close attention and continuous study; and, furthermore, the difference of constitutional make-up, temperament, idyosincrasy, and bent of mind of those who apply themselves to solve the machinery and problems of function is so great as to make it next to impossible to secure equal progress in any class of investigators in these transcendently important researches, be they practitioners, graduates, or undergraduate pupils. The differences of tastes and ability to comprehend the fine distinctions of health and disease, compatibility and incompatibility of food, the manner of taking it, and the presence at table and in society of pleasant or unpleasant associates, all must be taken into the account, to enable any teacher to do justice to both learner and himself.

Apprehension and appreciation of all these neglected conditions is necessary to comprehension of our subject, so as to insure correct diagnosis, prognosis, and treatment. The great error of our teachers of pathology and therapeutics is the assumption that the case in hand can be correctly diagnosed at one sitting, so as to warrant prognosis of results, and to lay out the whole course of treatment necessary to adequately complete the cure. I have often advised pupils, where they could not clearly diagnose a case, to take no steps of treatment in the dark, but rather to await developments or call counsel. Such considerations as these constitute a potent caveat to diagnosticians to beware of jumping at conclusions without putting forth every effort for the exclusion of error.

Poisons taken into the system disturb the poise or balance of nutrition. In the literal sense the word *poison* is derived from the Latin *potare*, "to drink." This is the true significance, for the tissues must take in the virus before the untoward ferment can supplant the normal molecular changes or benign fermentation constituting nutrition. Each specific poison induces a peculiar ferment of the pabulum in the tissues. As a rule two ferments do not work in the pabulum at the same time. Further, the capacity to take on specific fermentation, or, as it is usually called, infection, of one form of poison is destroyed by another, which has just run its course of molecular changes, which leaves the pabulum (juices of the flesh) in such poise—equipoise or balance—as to be indifferent to the presence of another virus. At other times and with other viruses two infections may both "take," as the saying is, and one remain inactive until the other has run its course, and then the quiescent one takes up its specific rôle in the same subject.

Syphilis and mercury are the two examples *par excellence* of systemic poisoning which tend to softening of the alveolar plates and their connective-tissue supports. Salivation resulting from taking poisonous quantities of mercury is so various in the extent of manifestation as to require considerable diagnostic ability to detect it in its beginnings, which is the more propitious time for successful treatment, without loss of some portions of the soft and hard parts of gum and alveolus. The softening from mercury seems to select the dental ligaments and periosteal structures at the edge of the alveolar plates, external, internal, and transverse, which softening is seldom so extensive as to constitute necrosis proper of these bones. Syphilitic cachexia seems to prefer the denser and larger portions of the bone forming the tooth-sockets, and hence kills extensive bone-territories by destroying the nerve and blood channels through which the nutrient supply is carried, by coagulation of the pabulum in the Haversian systems, and the blood in the capillaries in the Haversian canals, through which the currents are slow and minified, even in health, so as to have less power of resisting poisonous impressions than the blood and nerve-tracts in softer and better-supplied fleshy territories. These dense tissues retain the fermenting pabulum and blood, by reason of the tortuousness and smallness of the channels for blood and pabulum, preventing the inflammatory action reducing the territory to that embryonic condition whereby restoration to health could take place. And so the ferment goes on to the point of destruction of the functioning elements of tissue, and we thus have necrosis, a corpse of the locality, deprived of healthy supply of nutrient material.

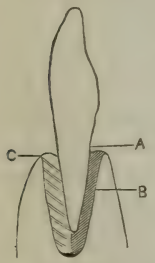
The prime requirement for the permanent resetting of loose teeth is to get them in place and hold them there until the sockets and gums are reformed and hardened to the necessary degree of strength to withstand active service. To do this, tying with silk is the means, which demands knowledge of proper occlusion and skill to effect it, by trimming and supporting them in place. The teeth should be trimmed by using fine discs, so as to have them occlude, in order that each tooth may do its own amount of the work of mastication, by receiving the impact of the jaws so as to drive each tooth directly into its own socket on a line with the axis of its greatest strength.

The vast majority of cases of loose teeth result from "pyorrhea alveolaris." This is usually insidious and local in its inception, while syphilitic and mercurial loosening are more or less general in attacking the tooth-sockets. The most important pre-requisite to get teeth firmly set in their sockets, after having been loose, is to get them in place and hold them there by simple and comfortable appliances. Loose teeth from fracture of their sockets only require adjustment and keeping in place. Those fractured transversely, without severance of pulp, have been successfully treated by slotting them and the adjoining teeth which were firm, and then connecting the fractured ones to the sound ones by means of a bar, of "clasp-timber" of gold and platinum, rolled or covered in heavy gold sheets, and the whole connected together by impacting gold into the slots over the bar, and finishing the whole range in one firmly conjoined fixture. These cases involve a knowledge of the principles of surgery to such a degree as to baffle most surgeons and dentists, for want of special knowledge of the teeth and jaws on the part of surgeons, and lack of knowledge of general surgery on the part of dentists. Here is the field of practice requiring special attainment in oral surgery, and it can be successfully taught only clinically.

Discussion.

Dr. Hodson. Dr. Atkinson has very rightly said that loose teeth from pyorrhea alveolaris are those with which we come most in contact. But I am sorry that he has given us the least information about that class of loose teeth. We want practical knowledge of what to do in those cases. They are the most discouraging cases with which I have to deal. I have to be satisfied with what I can accomplish, not with what I would.

Dr. W. H. Atkinson. We never have that disease when the teeth are legitimately used and the individual is properly fed. Almost always that disease attacks a tooth that is not used, for some reason or other. Loose teeth never become so from pyorrhea alveolaris alone. We do not know the source of that trouble; we only know that the teeth affected by it always loosen on one side or the other of the tooth, and not all around at the same time. In this illustration, A represents the root of a tooth, B its connection with the jaw, and C the direction of the fibers of the connecting-tissue. These are set so as to allow the impact of the teeth in mastication to close the fibers a little,—giving a little resiliency. When these are taken away by the retrograde metamorphosis that we call inflammatory action, and when that part of the root is free from its attachment to the alveolus, the tooth will always be invited towards the sound or opposite side. When a tooth goes in any one direction, that direction is the side that you depend upon as having a healthy attachment. Suppose one side of the mouth was in that condition, and suppose the first superior and first inferior molars are in the right position,—if the teeth are out of line when the mouth is closed, as is most always the case, so that they are playing backwards and



forwards, all you have to do is to see where the occlusion would be if natural; then bring the teeth together *there*, and tie them firmly with silk. Suppose that to be a central incisor; we will find where that tooth ought to be, and those that ought not to be moved will be your stand-point for regulating the others. Then begin and place them in the right position, and with a piece of waxed silk tie a single tie around them with two turns, making what is called a "surgeon's knot." Then go on to the other side. If those teeth are thrown out of line the patient cannot shut his mouth. Give the teeth a good position, and then take your corundum-disk and cut them down; and I advise you to be very sure to have some one with an abundance of water at hand, so that there will not be any ozone set free, nor any shock to the dentinal fibrillæ. Then occlude them so that each tooth shall stand in proper position to receive its share of the impact of the jaw. In most cases you do not need to apply anything in the way of medication but simple aromatic sulphuric acid. After getting the pockets below syringed out and laying laps of bibulous paper under the tongue, drop all the aromatic sulphuric acid around the teeth that will be drunk in, and until it stands in pools around every tooth that is in that condition. Use the same treatment above, the only difference being that there capillary attraction is all you will have to depend on; you will not have the assistance of gravitation. Then you need not clean those teeth; just let your patient go, and the next day you will see whether they need any other cleansing than simply with water. In most of the cases of pyorrhea alveolaris that have come under my observation the teeth have been destitute of tartar on the roots; and when it was present to any extent it has been that which is called sanguinary calculus. When that is there all you have to do is to take the course I have spoken of, and by the next day you will have cooked the surface that produced the pus. Then take one of those little fluted scaling instruments, and, having the gum held down by an assistant, just gently tap and knock off that little black tartar carefully. Don't go burring and slashing around *à la* Riggs. Then let your patient go away, no medication being needed ordinarily. Watch the case, and if it is one of low organization, and the attachments are loose, carefully put the gum up with your fingers, and coax it into place. Take a little bibulous paper, and lay it on under the lip and tongue. You will find the next day that you will not see another drop of pus, and there will be needed merely a surgical dressing. We had a beautiful illustration of this in the mouth of Dr. Elliott's patient to-day. There was a pocket made of Reese's metal. It was a very easy pocket to make, and it shut out the food. All the case needs is just to let it alone, except to look at it every day. But do not kill all the little mouths that are growing there by what I call over-treatment.

Dr. F. Y. Clark. Dr. Atkinson states that after tying those teeth up you may let your patient go without any attention to cleanliness and no instruction as to brushing. Now, you know that there is a great deal of fermentation and ulceration going on about teeth that are in that condition, and I hold that absolute cleanliness is very essential in those cases. It is the most important point in the treatment of them. I think, however, that you can bring this about, and ought to do it, by using antiseptics instead of powders. I long ago discarded powders. Within the last year or two I have been trying to restore such loose teeth by putting the rubber on, and then tying floss silk around them to keep them in position; then taking a little phosphate cement, and packing this in around the silk thread—not making it bulge out, but packing it artistically; giving it ten or fifteen minutes to harden, then drawing the rubber out. Then, if you want to use your disks, you can do it with more safety because the cement will hold the thread. After doing that I am then exceedingly particular in regard to cleanliness. I give my patients my pet wash, which is nothing but carbolic acid and glycerin, with sometimes a little aniline. I tell them to use it with a brush. If my instructions are carried out, I expect to see in two or three days a great change.

Dr. Bödecker. Gentlemen, you have been listening to the most interesting paper on the pathology of loose teeth that I have ever heard. One word in regard to cleanliness of the mouth and bacteria. Some three or four months ago I had some thirty-six or thirty-eight specimens of pus and exudations collected from around the necks of teeth affected with pyorrhea alveolaris, when, on the 15th of October, I believe, my young man set my window on fire, and my preparations in this line, as well as a paper I had written on the subject, were burned up. But this much I can say, that I remember that those specimens in the pus of which were present the most bacteria were just those cases that were the most amenable to treatment. I am sorry those specimens were lost, because I had a great deal of trouble in preparing them. I did so in the following manner: I had two specimens of each individual. I will say, in the first place, that you can easily distinguish bacteria in a glycerin solution; but if you want to be surer than that, take a little of the pus and put it between two perfectly clean glasses, which have been subjected to the treatment of hydrochloric acid, and afterwards put into a solution of soda; then washed thoroughly and afterwards put into alcohol and thoroughly heated. The thousandth part of a drop is sufficient, if placed by an instrument between these two covered glasses, so as to make a thin layer of it on both surfaces. Hold them over a spirit flame, and then cover them afterwards with aniline. By this method you will be able to see and distinguish bacteria very much easier than in a glycerin preparation. As I said before, these preparations were very interesting to me, because in making them I found that the more acute the case of pyorrhea alveolaris was the more bacteria were present in the pus; and in those cases of a more incurable nature there were the least bacteria,—especially in the class of loose teeth which have gone down to the stage of pus, where there is merely a breaking down of the fibrous connective-tissue into the embryonal condition. Those teeth are just as loose as those where pus is present; yet with the most thorough microscopical test I have never been able to see a single bacteria, nor has Dr. Waldstein, who has been in almost every hospital in Germany, and has made a specialty of hunting bacteria.

Dr. S. C. G. Watkins. I would like to ask Dr. Atkinson if he finds pyorrhea alveolaris in cases where all surfaces of the teeth have been thoroughly cleaned, the gums brushed in a proper manner, the teeth well used in masticating, and floss silk used between them in cleaning? I have always felt that where there was absolute cleanliness, and the teeth were properly used, such a condition of affairs as has been described could not exist.

Dr. Atkinson. Pyorrhea alveolaris means pus of the alveolar sockets. Now, we have pus of two kinds. Pus is dead blood,—is blood that cannot be wrought into tissue again; that cannot be wrought into pabulum, to be converted into protoplasm, and so through all the steps of conversion into the various tissues. Pus being dead blood, is made up of two substances—corpusculary and fluid. In the cleanest mouth I have ever seen I have found fluid pus, and occasionally I have seen the corpuscular there. The patient had the most beautiful set of teeth you can imagine, and was very careful in regard to the condition of her mouth; yet disruption went on, and at last, against my advice, she had the teeth extracted.

Dr. Watkins. I am very glad that I asked Dr. Atkinson the question, as it has brought out a point that is generally overlooked, viz., the proper method of brushing the teeth. It is a subject in which I have been much interested. About two years ago a speech from Dr. Atkinson had the effect of changing my ideas somewhat in regard to using the brush. It should always be drawn with the grain of the tissues. Do not brush the teeth crosswise; do not brush them up and down; they do not require scrubbing. If you brush them up toward the gums you are liable to work small particles of foreign matter under the gum, which becomes an irritant, and causes the gums to become swollen, and externally recede from the necks of the teeth. If the brush is used crosswise the gum not only recedes, but you wear into the teeth just at the juncture of the enamel and cementum. About a week ago I had a case of a lady about forty years of age, who had beautiful teeth, and kept them very clean on the labial and buccal surfaces. By brushing crosswise the two central incisors were so worn by the brush that I was obliged to fill them, and had some difficulty in doing so without exposing the pulps. All the six front teeth were worn considerably. I therefore heartily endorse Dr. Atkinson when he says the upper teeth should be brushed down, and the lower ones up, giving the brush a turn as you draw it, to throw the particles out from between the teeth.

Dr. Hodson. I invariably advise my patients to brush their tongue as well as their teeth. We do not stop to think how much the tongue collects, and that it is carrying just as much disagreeableness as the teeth do. If my patients will do it,—and very few of them will,—I advise them to use a little carbolic acid in the water in which they cleanse their teeth, night and morning.

Dr. E. Parmly Brown. I had the pleasure, while attending the Medical Congress two years ago, to meet Dr. Riggs in London, and I was even so favored as to be permitted to sleep with him for fourteen days on the return voyage. What I didn't find out about Riggs's disease is not worth speaking of; and I came home and cured some stubborn cases of this disease that I had failed before to conquer. One case that I am especially reminded of was that of a particularly clean, sweet mouth. Her mouth was absolutely clean, except the left upper lateral and the second and first bicuspid, which were loose. I had been five years trying to cure them. When I got home I commenced work on those teeth, and at the end of three months I had them all right, and they have been all right ever since. I took delicate instruments and cleaned all around those teeth. I shortened the teeth, and gave her a wash composed of about five per cent. carbolic acid, and the balance, I believe, was tincture of myrrh. The five per cent. of carbolic acid and nature did the business, while the tincture of myrrh drew the tissues up around the teeth so that nature could make the union. One reason why my former treatment, which was very similar in some respects, did not succeed was that I did not shorten the teeth. When I got things in such a position that the occlusion would not keep moving those teeth and breaking up all the new tissue, then nature was enabled to effect a cure.

Dr. Atkinson. Dr. Clark said, as I understood him, that there was no acid without bacteria, and no bacteria without acid. That is a splendid aphorism to start with, if he will prove it. Then the question will arise, Which is first, the bacteria or the acid? Then, of course, we are precisely where we are in regard to the question of evolution,—was the hen or the egg the primal of the chicken?

Dr. F. Y. Clark. This is one of those mooted questions that we are still fighting over. Dr. Miller has written a good deal on it, and I have written some myself. It is the same question that Kohn and Pasteur have discussed rather cloudily. I wish it to be distinctly understood that in all I have written on the subject I have not changed my opinion three or four times, but that I am just where I was fifteen years ago,—namely, that there is no acid without bacteria, and there is no acid without fermentation. Fermentation brings about an acid, and bacteria brings about fermentation. There can be no putrefaction without bacteria. I have devoted years to examining vegetable and animal matter with the best objectives I could get, in order to determine this point. Put a few grains of meat into a glass of water and let it stand forty-eight hours, and you will see the water become cloudy, and after a while there will be such an odor from it that you can hardly stay in the room. When you see this cloudy condition, that is bacteria-termo—the true organisms of putrefaction. When this cloud disappears and the water becomes quite clear, look into it and you will see a sediment at the bottom. Examine this sediment and you will find dead bacteria-termo. They have done their work. Life is but a wheel, with no beginning or end; new life commences wherever bacteria-termo may be found. You all know that on examining a specimen of vinegar you will find organisms. Examine a specimen of alcohol, and you will find organisms; one follows the other in beautiful succession, until you have finally the organisms of putrefaction. There can be no acid without micro-organisms. In regard to the question as to which is first, the hen or the egg, I contend that the bacteria produce the acid. How is this first attack brought about? A patient comes to you with an absolutely normal condition of the teeth and oral cavity; everything is absolutely perfect. There must be an attack there somewhere, if decay goes on, and the question is, How is that attack made? The first cause is probably some negligence on the part of the patient, in failing to use the tooth-brush and properly cleanse the teeth of particles of food, when fermentation takes place. A little more negligence, and an acid is generated, and bacteria are generated. The question is, Which makes the attack, the acid or the bacteria? It is certain that, where you find a pit or roughened surface on the teeth, there you will find bacteria. My friend, Dr. Miller, has made several mistakes in this matter. I know they are mistakes. The attack on the enamel, he states, is a kind of white, crumbling attack, produced by acids. Examine this decay carefully with a one-eighth objective, and you will find in this disintegration of the enamel a lot of fine, powdered enamel, that is not produced by acids. I have tried fifty times, and I cannot produce this powder by an acid. But you will find the bioplasm or life-substance—the basis-substance—removed, and that disintegration has taken place, and you have this crumbling substance; and in every instance below the enamel on the dentine you will find devitalized bacteria.

Dr. Dexter. I understand Dr. Clark to say there is no acid without bacteria. How does he account for the origin of nitric or hydrochloric acids?

Dr. Clark. You are trying to catch me. There can be no acid without bacteria. There can be no acid without fermentation. Fermentation produces acids.

Dr. Atkinson Does vegetable matter putrefy?

Dr. Clark. Most certainly.

Dr. Atkinson. What is the difference between putrefaction and fermentation?

Dr. Clark. Take a piece of meat and some vegetable matter, and let putrefaction take place in them, and I think you will know the difference if you smell them.

Dr. Bödecker. Dr. Clark says that all decay is caused by bacteria. Does Dr. Clark entirely ignore the reaction of protoplasm? I made some investigations in caries, and I found that, wherever there is the minutest touch of caries on the external part of the enamel, reaction of the protoplasm takes place near the boundary of the dentine and the enamel. The enamel has not been broken down there. Does Dr. Clark believe that the bacteria can make their way through the enamel to this point, or is this the cause of the reaction of the living protoplasm of the enamel?

Dr. Clark. The canaliculi of the dentine are filled with what we call biolene or living-matter. These organisms must live upon something to propagate themselves. What do they live on? They do not eat, but they absorb this bioplasm in the mesh-work, and disintegration is the result. The live matter is removed. The acid is not there, but the bioplasm is dissolved, and you have disintegrated lime-salts.

Dr. Bödecker. Then, according to that, the whole teeth must be filled with bacteria, because this tract is far away from the decay, and the canaliculi are not enlarged at all, nor is the bioplasm at all absorbed or eaten away.

The society then adjourned.

JAMES E. DEXTER, M.D.S., *Secretary.*

CLINIC.

Dr. Louis Elsberg gave a clinical lecture on "Syphilitic Manifestations in the Oral Cavity."

Dr. J. L. Williams, of New Haven, exhibited five or six pieces of bridge-work, one of them in the mouth of Dr. W. H. Atkinson, taking the place of a plate formerly worn. One of the pieces shown by Dr. Williams was a new style of removable bridge, easily taken out for purposes of cleanliness or repair.

Dr. W. S. Elliot presented a case of necrosis, which Dr. Atkinson described as "necrosis with the loss of the posterior plate of the right superior central and lateral and cuspid. The necrosed bone has been removed; the teeth occlude perfectly, and are firm, the anterior plate not having been disturbed at all, and it is a very promising case."

Dr. Elliot stated subsequently that he had not removed any of the necrosed process artificially. The treatment was application of a solution of tannin and glycerin, and the wearing of a metal plate to prevent direct contact of food with the parts.

Dr. E. Parmly Brown filled a right upper lateral. Dr. W. S. Elliot exhibited a new flask of peculiar shape, and a separable rubber-dam clamp which does not press upon the gum-margins. Dr. E. M. Flagg showed specimens of a combination of continuous-gum and celluloid. Mr. E. T. Starr exhibited a new drop tube. Dr. Bödecker began the treatment of a pulpless tooth, which had had its roots filled with amalgam, and had given its possessor, Dr. G. S. Meigs, much trouble.

SOUTHERN DENTAL ASSOCIATION—SIXTEENTH ANNUAL SESSION.

THE sixteenth annual session of the Southern Dental Association was held in the rooms of the Young Men's Christian Association, at Lexington, Ky., commencing Tuesday, May 6, 1884, the president, Dr. H. J. McKellops, in the chair.

Owing to the non-arrival of the secretary and treasurer, Drs. T. S. Waters, of Baltimore, and W. R. Clifton, of Waco, Texas, were appointed secretary and treasurer *pro tem.*

FIRST DAY—*Morning Session.*

Dr. R. B. Winder, chairman of the Committee on Dental Education, read a lengthy paper, of which the following is a synopsis:

It would be impossible, the paper said, to properly discuss dental education without having as a basis some idea of education in general. In the past the extreme of general education was found in the studies embraced in a collegiate course of four years, and the young man who had passed through this was classed among educated men. Now, however, the arts and sciences have so multiplied, and the spheres of knowledge have so increased, that no sane man would think of undertaking to master them in four years. As the world advances in knowledge this difficulty increases, and, inasmuch as a boy cannot learn all, the practical question of the day is, What studies shall he pursue, and what shall he neglect? We can easily demonstrate that a high order of scholastic attainments is not only not necessary, but is sometimes prejudicial; for it is success in life that men pursue. The writer would lay down the broad proposition, that no matter toward what end a young man is to direct his energies, so far as his education is concerned, he should first of all be thoroughly taught the essentials of success in his especial calling; so much of general education should be given him as is necessary to this preparation. Having attained these essentials, it is his high privilege, and his duty, too, to cultivate and enlarge his mind in every way.

The paper instanced the case of one of the most successful business men of Baltimore, one largely engaged in manufacturing, who had entered a counting-room at fourteen years of age and worked his way up. He wished to keep his sons at the best schools till they were fifteen, and then take them into his business, so as to fit them to assume charge of it. His wife wished to give them a university education, winding up with a tour of several years. If this were done, he maintained, his interests in business would have to be disposed of at his death, in order to give the boys their share of his estate, and they would then become mere useless "hangers-on" in life; while if the plan he desired were adopted, they would have a fortune before them and useful positions in life.

Special education means the teaching of those things pertinent to a given pursuit. The writer believed it was now admitted by all thinkers that he who is master of the most advanced knowledge in any one direction is not without education. Practically, that man is best educated who most thoroughly understands the essentials of success in his field of effort.

We come now to dental education. Dentistry really dates its origin as a profession from the foundation of the Baltimore College of Dental Surgery, forty-six years ago. Since that time one dental college after another has sprung up, and many medical schools have added dental chairs to their medical faculties. This state of affairs naturally has caused great diversity of opinion as to the best method of educating the future dentist. The paper then proceeded to discuss the various views of different educators, arguing that while dentistry is a specialty of the healing art, it is not a specialty of M.D.-ism. There is nothing written in the text-books of medicine on dentistry; there is no dentistry in the medical curriculum; nor do the medical schools pretend anywhere to teach dentistry. No physician, however skillful, could possibly take charge of a dental practice, and the medical schools give their graduates in dentistry the distinct and separate degree of D.D.S., thus notifying the public that they do not consider an M.D. a dentist, nor a dentist an M.D. Moreover, dentistry and medicine are regarded as separate and distinct, though kindred professions. Those who would use the old argument that because an oculist or an aurist is an M.D. the dentist should be, forget the difference required in the training; they forget, too, that because a large portion of the knowledge of medicine is as useless to the oculist as to the dentist, there is among the medical profession a widespread belief that medicine nominally, as well as practically, should break up into specialties, each having its distinct degree and system of education. This separation must come in the future, and it would be the best means of advancing the different specialties. Prof. Huxley said in Baltimore, a few years ago, that the reason why medicine had accomplished so little was because it had undertaken so much. Medicine has done much to aid us. We have our knowledge of anatomy and physiology from it; we have learned much from medicine in pathology and therapeutics. But we have given something in return: we have given them anesthetics; we have given them the interdental splint, and they are utilizing our engine in nice surgical operations. We are, or ought to be, skilled artisans, first-class mechanics; and this it is which makes the great dividing line between the two professions. For dentistry stands on three pillars—mechanism, artistic taste, and theory. Everything that we enjoy in life from human hands is ours through mechanics and artistic taste. Strange to say, these two branches of science and art furnish the main essentials of success in dentistry. A dentist deficient in either could never attain any high success in his profession. Add to these theory, or a knowledge of cause and effect, combine with all a certain amount of general and ornamental education, and you have the education of the dentist completed to the highest point.

How shall this be accomplished? We will probably all agree that the best means of education is through college training, and having agreed to this we will proceed to build our model school. We would locate the school in some large city, because nowhere else can be found a sufficiency of clinical material. No first-class dental college does or can exist outside of a large city, and even there there is not always an abundance of infirmary and laboratory patients. The idea of teaching dentistry theoretically is an absurdity. An intelligent mind can rapidly acquire theory, but skilled workmanship comes only from constant practice. The training of the eye and hand, and the cultivation of artistic taste, should be the main features of a dental education. We would select all the subject-matter pertinent to dentistry, and discard everything foreign to this object. We would, of course, have a corps of professors and teachers, selected, if practicable, from the dental profession, because the practical dentist would know much better than the medical man what should be taught in the theoretical branches. We would have chairs of anatomy, physiology, chemistry, pathology, therapeutics, dental surgery, operative dentistry, and mechanical dentistry. We would teach as much of anatomy, physiology, pathology, therapeutics, and chemistry as a dentist should know, and we would stop there, because we would have no right to tax unnecessarily the time and brains of the student. In the practical branches we would teach everything that is known, and teach it thoroughly. Matriculates without mechanical talents or artistic taste would be advised to pursue some other calling, for such men cannot be successful in dentistry. The dentist is mainly developed in the laboratory and infirmary, and there no pains should be spared to attain our end. Every attention should be paid to diagnosis. The student ought especially to be informed in regard to the diagnosis of malignant and non-malignant growths in the oral cavity, and should be educated to perform minor surgical operations. Capital operations about the head and face belong to surgery, not to dentistry. The two are distinct, and cannot be combined. The dentist is educated in the dental infirmary; the surgeon in the general hospital, and it is as much as either can do to master his specialty. If a dentist desires to become a surgeon, let him go to a medical school and receive his surgical education. Our dental schools have no hospitals attached to them, nor do they need them. There should be graded courses at the model school, but the student should be allowed to enter whatever class he was qualified to join. The standard of graduation should be governed by a sufficiency of acquirements. It is the amount of knowledge that a student possesses, and not the time spent in acquiring it, that merits the degree. The resolutions passed by the National Board of Dental Examiners at Niagara last summer were not wise, in the opinion of the writer. They pledged eight States to demand that the colleges require two winter courses of attendance, accepting as the equivalent of one five years' practice, or a course in some other reputable dental or medical school. This would place all colleges who conformed to the requirements upon an equality, which no thinking man would admit. So far as elevating the standard of graduation was concerned, nothing was done. A meeting of the faculties of the dental colleges in the United States has been called for August 4th, in New York, to see what can be done towards inaugurating a more uniform system of education and graduation; and the National Board of Examiners meets a few days afterward at Saratoga. Let us hope that much good may come out of these meetings.

We need, however, all our spare time at college to cultivate artistic taste, and this involves the close study of nature. We need an accurate knowledge of physiognomy, the necessity of which to the dentist was shown by a quotation from a paper by the writer, which appeared in the *American Journal of Dental Science* for March, 1869.

Dr. J. Taft, Cincinnati, thought there was no doubt that the paper just read would receive the cordial approval, in many respects, at least, of all present, though on some of the points raised there might be room for a diversity of opinion. The general direction of its argument is worthy of hearty commendation. In the former part of the paper there seemed to be an intention to discourage a high order of general education for the special student. If he were to make a criticism it would be that the paper failed to tell us how much of the different branches of general education should be required of the student of dentistry; that it does not tell us the degree of attainment in general knowledge to which we should lend our aid. He would have been glad if Dr. Winder had been more specific on this point. Everybody will concede at once that an ignoramus should not enter upon the study of dentistry, because he has not the ability requisite for the highest success. The question presents itself in two phases: First, what degree of general education is necessary to the dental student; and second, what degree will be required to give him the power in the community which should be his. What degree of general education should the student have? We are told that there are certain branches which he must study—not necessarily all. We are told that he must have a knowledge of anatomy. But how much? The paper does not tell, but perhaps the most of us would be able to form an approximately correct idea—a knowledge of that portion to which his professional life will be devoted. In studying the anatomy of the head there is much in the nomenclature for which the student should be prepared by previous education. Most of the terms used are derived from the Latin or Greek, and the man who attempts this study without some knowledge of the roots of these names would be lacking in a very essential matter, as anatomy is taught. The speaker would prefer, and he had more than once advocated, that the nomenclature of the medical sciences be anglicized. But this seems at present impracticable, and the student must be able to receive the information as it is offered to him. A thorough knowledge of the roots, though desirable, is perhaps not necessary, but he should know enough about them to enable him to recognize the signification of the terms used. Without this knowledge nomenclature is simply a matter of memory, the terms which are used possessing no significance to the student until he has ground them into his memory. The speaker did not think Dr. Winder would say that the student should not have this knowledge. All branches of study are loaded down with a nomenclature that is very difficult to a man not grounded in the elements of classical education, until he has, parrot-like, committed the terms to memory, and it takes him much longer under such circumstances to acquire a proper knowledge of them than should be necessary. About mathematics—how much knowledge of this branch of general education shall the student have? No one will say that the student should be totally ignorant in this particular. The study of the languages is perhaps not important, except as stated, for the purpose of aiding to master nomenclature—but it seemed to him that a pertinent question was, How much of the natural sciences and mathematics, etc., should be demanded?

It has been the opprobrium of dentistry that too many in our ranks are ignorant. How often do we hear it said that such and such a practitioner cannot write a sentence correctly,—orthographically or rhetorically. Every student before he is accepted should be required to be able to use the English language in such a manner that he will not disgrace the profession as a body in the eyes of educated people. How can we expect to take an elevated position when so much of ignorance is found in our ranks? The power of an educated man, other things being equal, is infinitely greater than that of one without education. The speaker knew, as did everybody else, of isolated cases where men without education had, by sheer force of natural capacity, attained a high degree of ability and influence, in the dental profession as well as elsewhere; but you can count on your fingers those who have so succeeded. Cultured people are regarded in a very different light from those who are not educated. If we regard these things properly we will all desire the mass of the profession to be educated, to be cultured. The study of the esthetics of restorative dentistry should be more general than it is. Not one practitioner in twenty gives any attention to the restoration of the features. The whole object seems to the majority to be accomplished when the restoration of function is complete. Let us lift up all the branches together and give them all an equal development. The speaker was not ashamed to compare dentistry with the medical profession, even as they are seen to-day, in real attainments and in solid advances for the good of humanity.

Dr. H. A. Smith, Cincinnati, thought the doctrines advocated in the paper were sound in the main, but he differed with the idea advanced in the earlier portion as to the advisability of putting boys into business at an early age. He thought it wrong to take a boy from school at the age of fifteen for that purpose. It robbed the boy of all opportunity to attain a higher education. It was a lamentable fact, the speaker admitted, that many of our most successful business men are illiterate and ignorant. A young man of his acquaintance, with a fine education, succeeded to the business left by his father, and in the course of time failed. But was the failure because of his college education? Dr. Winder is partly right in his idea, if the highest aim in life should be to make money; but the speaker was not prepared to admit that this was the highest purpose of life. He had an acquaintance, who made fifty times as much money as he did, but the man's life was sordid—his whole existence absorbed in the business of accumulating dollars. He (Dr. Smith) did not care to spend his life that way. Dr. Winder pictures a splendid ideal dental college. If he conducts the school now under his management on the plan he delineates we should all send our students there. The speaker's idea as to the training of the student of dentistry is to first make him a dentist—give him the knowledge that will enable him to begin practice successfully. Then, if he wishes to broaden his view, let him study medicine or geology, or whatever he thinks will best aid towards that end. In teaching anatomy the ideal dental school which has been held up before us would give the student just enough knowledge to enable him to practice dentistry successfully. But this is not enough for the highest development. The educated man is always ready to grasp everything coming within his reach that can be brought to bear on his calling. The student has no time during his pupilage to acquire all the knowledge that will be useful to him. Teachers must instill into the minds of students the idea that what they are doing is merely preparatory—that they must keep right on after graduation acquiring useful knowledge from whatever source may be open to them. So far as clinical instruction goes he believes in beginning early the training of the student in manipulation. Practice makes perfect, and the sooner practical training commences the greater will be the skill acquired.

Dr. Taft. As to the highly educated man in business, it is to be said that if to rake in dollars is the chief object of life, the ignorant man can do that as well as the other. When the educated man fails, what is the cause? It is not his education. You know that there are many highly educated men who have made brilliant careers as business men; but these do something more than rake together dollars.

Dr. J. J. R. Patrick, Belleville, Ill. The further we go back in the history of the advancement of man the less we see of specialism. Specialism is division of labor, and to this all the advances of man are due. In former days, before mankind understood the advantages of a division of labor, the progress of the race was very slow; and the almost incredible advances of modern times are due wholly to the universal prevalence of specialism in every department of human effort. Dentistry is a specialty of medicine; do what we will, we cannot make more or less of it. The practice of medicine is not a science; it is the result of science. If it were a science there would be no isms and no pathies in it. It is a big field of speculation, with science as its foundation; but just as soon as the medical men begin to practice, they cut loose from science, and enter the field of speculation. The more a man knows of the natural sciences the better he is qualified for practice in any profession. Would anyone here presume to know as much about the teeth as Richard Owen? Owen could construct the whole skeleton from a single bone or from a tooth. We don't expect all dentists to be Richard Owens; neither could he have attained his profound knowledge had he been compelled to practice as a dentist. But there is no question that the more the dentist knows without robbing himself of practical experience for the opportunity of acquiring it, the better qualified he will be to practice. Dentists are as well posted as the physicians when they graduate. The physicians have more knowledge in some directions; the dentists in others. What a young man beginning practice wants to know is where to place his hand on what he needs from time to time. When he has acquired the knowledge that will enable him to do this in any case which may come up he will have read a great deal. Books are made up one out of the other. The latest on any topic, if it is a real advance, is an epitome of all that is valuable in those that have gone before. Professors are guides to show the student what to read and where to find it. The speaker's idea was that the student should take all the information he could get hold of. No student leaves his (Dr. Patrick's) office who cannot give the anatomy of the mouth and face, and describe the motor nerves and the nerves of expression. When the student knows this much he knows a good deal of anatomy.

Dr. Winder had never meant to say or to intimate that the student should be an uneducated man. He had discussed that question in the paper, and had concluded with the expression of his opinion that the dental student should be given *quantum sufficit* of general education to enable him to grasp the special information which would be put before him. The dental college as such should have nothing to do with the acquirement of general education, beyond ascertaining that the matriculate had a sufficiency of knowledge to enable him to understand the special teaching. He thought that he had made his ideas clear, though he was unable to go into details because of the length of the paper. As to Dr. Taft's objection that the nomenclature of anatomy is simply a task of memory to the uneducated, he would ask, what is all language but an exercise of the memory? He instanced Agassiz's methods of teaching anatomy. The first step was to throw away the text-books, and then begin at the lowest order of the vertebrates to see what the student could make out of it, and then mount upwards through the scale. What was meant by the term *quantum sufficit* was that we are wronging the young man who comes to us for education in dentistry by requiring from him things that are not necessary. There are many young men who have not the means to attend the very lengthy terms at college which would be necessary if all the additions to the curriculum which are suggested from various quarters were insisted upon. A lady teacher of his acquaintance had said that Geo. Peabody's bequest of medals for prizes for proficiency in studies in various grades of the schools were most unfortunate, and she told him of a number of bright children now lying in the grave-yards because injudicious parents had urged them to compete for these prizes.

Dr. Taft. It is true, as Dr. Winder has remarked, that the dental college has nothing to do with the getting of the general education, but it can refuse to take the candidate as a student until he has sufficient general knowledge to enable him to pursue the special studies with facility. And the profession, also, should take that stand, when considering applications for studentship, and should encourage those who apply to the attainment of a reasonable amount of education. Many have heretofore taken students because it was thought they might make good dentists; but this was not the way to do. The students should get the education first, before their training as dentists began.

The subject was passed, and the meeting adjourned to meet at 8 o'clock P.M.

Evening Session.

Owing to previous engagement for this evening of the hall in which the sessions were held, the meeting convened at the office of Dr. Rawls, President McKellops in the chair.

The subject of Operative Dentistry was called, and Dr. Patrick was asked to give his views on "Regulating Teeth."

Dr. Patrick. There are many considerations to be taken into account in regulating teeth. No two cases are exactly alike, either in the degree or manner of displacement or in the difficulties to be surmounted in bringing the teeth into position. That a tooth can be shifted there can be no doubt. Nature has set us the example by setting the tooth out of its proper place. If nature can set the tooth out of its place, art can, by similar means, restore it. Every appliance for this work, to be successful, must be constructed and must act in accordance with certain fixed principles which have been known since Archimedes explained the operation of the lever. Another principle in regulating is, go gently. The work cannot be hurried; time is absolutely necessary. When you undertake to shift a tooth you have to recognize that it is inclosed in a cell surrounded by cancellated bones, which form what is known as the alveolar process. Now, as the roots of the teeth are of different shapes, they all have differently formed cells, and these points must be thoroughly understood before at-attempting to regulate mal-placed teeth. Take the first bicuspid, for instance. While it sometimes has two roots it always has two cells. In shifting the teeth we disturb every one of the cells and every one of the septa between them; so that it will readily be seen that every tooth requires to be treated differently from every other. Another principle that should not be lost sight of is, never to lift the tooth out of its cell. No time is gained by lifting it, as, if lifted, the process must be absorbed, to get it back into its place, and that requires time, and you will really gain more by moving it directly against the cell-walls. In moving the teeth it is always better to have two fixed points, though one will do in case of necessity. The advantage in two fixed points is that when you apply the power—as, for instance, with two molars on opposite sides of the mouth as your fixed points,—they will not be moved from their position, because the power presses on both at once. When a plate is used there are generally more than two fixed points. The molars are as easily moved as any other teeth, and if there is only one fixed point and one movable, say, in moving a bicuspid, the molar is as likely to move as the bicuspid. There is a marked difference between the superior and the inferior maxilla. The inferior maxilla is an arch in which the ends converge, and of which the outer plate is the weaker, the internal arch being stronger, because in the first place it has a thicker wall, and in the next place its wall is reinforced by the palate bone. It is therefore easier to move teeth outward than inward in the upper jaw. In the lower jaw the process opposite the molars is reinforced on the outside by a hard, bony external oblique ridge. In extracting lower molars, after the first rotary motion, the forceps should be thrown inward. It will be seen from the configuration of the parts that to move an inferior molar outward in regulating would be almost an impossibility; it would at least take a long time. Just forward of the second bicuspid the process is thinner outwardly than inwardly. To move an inferior bicuspid would take a long time because of the length of the root. It is therefore very fortunate that the front teeth are oftenest to be moved. These can be handled very well.

Dr. H. A. Lowrance, Athens, Ga. At what age would you deem it advisable to attempt regulation?

Dr. Patrick, in reply, stated that he had received almost innumerable applications from members of the profession for the appliance which he had introduced, and many models of cases with the request that he fit the appliance to them. In many of these some of the deciduous teeth were still present; in others the permnanent teeth were still coming. He advised that all such be let alone, as the probabilities were that many of them would come right in time without interference. The best time is when the patient is under twenty years of age; he would not touch a case until say four years after the first permanent molars are thoroughly developed—say about the age of fifteen years. As a rule he would not put any regulating appliance on the teeth while the little cusps which stud the cutting edges of the incisors when they first erupt are visible, because, as long as these remain, it may be known that the roots are not fully calcified. This is a sure guide. When these cusps are worn off it is a positive indication that the apex has closed. The same rule holds with the molars.

Dr. Lowrance. Would you take a case of regulating for a patient say twenty-five years of age?

Dr. Patrick. Yes; at twenty-five, or thirty, or forty, if the patient was healthy.

Dr. Patrick then explained how to attach his appliance. The fixed points should be as far back as possible. It is not necessary that the bands for attachment should fit tightly, provided they are accurate enough to prevent wabbling. All that is needed is to fit the band approximately and to bring tension on it to hold it. A tooth is subservient to the same laws that govern the hair, the nails, etc., and all we have to do is to work inside of those laws. With regard to heredity, we find irregularities of the teeth among all races of men. The lower we go down the scale of humanity the better the teeth become as regards regularity. The Australian, the lowest type of man, has more regular teeth than the Congo negro, and his teeth more nearly resemble those of the orang and the gorilla. The higher up the scale we go the more mixed becomes the character of the teeth. There are many different races of men, and there is nothing physiologically to prevent them from mixing, the highest with the lowest. They have necessarily crossed, and in crossing they have acquired deformities. The Europeans are more mixed than any other races, and there is more irregularity among their teeth than in any other race.

Dr. McKellops, by request, briefly described the Coffin method of regulating. It is simply the application of a split plate of vulcanite to the arch, the shifting of the teeth being accomplished by the traction of a piece of piano-wire. This method has not attracted so much attention here as in Europe. He had never seen anything act so like a charm and with so little pain and trouble.

Dr. J. Hooper, Louisville, had heard Dr. McKellops explain the Coffin method two years ago at Cincinnati, and since that time he had used it very successfully in some twenty-five or thirty cases. There was only a little soreness during the first three or four days after the fixture was applied.

Dr. McKellops. Dr. Coffin, like Dr. Patrick, does not care how old the patients are, provided they are healthy.

Dr. R. B. Winder, Baltimore, asked if Dr. Patrick had noted the teeth which result from the cross between the white father and the Indian mother. In the skulls in the Army Medical Museum at Washington the teeth are almost invariably those of the white man and not of the Indian squaw.

Dr. Patrick had never been able to find an accurate distinction between the teeth of the white man, of the Indian, and of the negro. He could tell the teeth of an Australian if mixed in a bushel of others, but as between the others he could not see where the line was drawn.

Adjourned.

(To be concluded.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The Dental Society of the State of New York held its sixteenth annual meeting at Albany, May 14 and 15, 1884.

The following were elected officers for the ensuing year: L. S. Straw, president; Frank B. Darby, vice-president; J. Edw. Line, secretary; H. G. Mirick, treasurer; W. H. Atkinson, correspondent. Wm. Jarvie, Jr., and S. B. Palmer were re-elected members of the Board of Censors.

The degree of M.D.S. was conferred upon the following, on the recommendation of the Board of Censors: John J. Mills, Lonedo Frazee, Albert M. Wright, Herbert Allen, DeWitt Barker, and Linzey M. Hall.

J. Edw. Line, *Secretary*,
Rochester, N. Y.

IOWA STATE DENTAL SOCIETY.

The twenty-second annual meeting of the Iowa State Dental Society was held at Council Bluffs, May 6, 7, 8, and 9, 1884. E. E. Hughes, Des Moines, president, in the chair.

Although at the extreme western part of the State, the meeting was largely attended and was one of the best in the history of the society. The dental law and dental department in the University are having a marked effect in raising the standard of the dental profession in this State.

The society will meet permanently every alternate year after next year at Iowa City.

The Iowa State Board of Dental Examiners met on Monday previous to the meeting of the society, to examine candidates for license to practice dentistry in Iowa.

The following are the officers elected for the ensuing year: S. A. Garber, president; L. E. Rogers, vice-president; J. B. Monfort, secretary; J. S. Kulp, treasurer.

The society adjourned to meet at Des Moines, on the first Tuesday in May, 1885.

J. B. MONFORT, *Secretary.*
Fairfield, Iowa.

ILLINOIS STATE DENTAL SOCIETY.

THE Illinois State Dental Society held its twentieth annual meeting in Springfield, commencing Tuesday, May 13, 1884, and continued its sessions for four days.

The following officers were elected for the ensuing year:

H. H. Townsend, president; W. H. Patton, vice-president; J. W. Wassall, secretary; P. J. Kester, assistant secretary; C. R. Dwight, treasurer; J. W. Cormany, librarian; D. J. Pollock, C. F. Matteson, and W. C. Martin, executive committee; E. D. Swain, T. L. Gilmer, and Garrett Newkirk, board of examiners.

J. W. WASSALL, *Secretary,* 103 State St., Chicago.

AMERICAN DENTAL ASSOCIATION.

THE twenty-fourth annual meeting of the American Dental Association will be held at Saratoga Springs, N. Y., commencing on Tuesday, August 5, 1884, at 10 A.M.

GEO. H. CUSHING, *Recording Secretary,*
34 Monroe st., Chicago, Ill.

The American Dental Association meeting at Saratoga will hold its sessions in the Supreme Court Chamber of the Town Hall. Arrangements have been made for the usual reduction in railroad rates to delegates. No reduction in hotel rates has been secured. The terms vary from $2.00 per day in boarding houses to $5.00 in the largest hotels. Delegates can secure rooms by writing (as long in advance as possible) to Dr. C. F. Rich, of the Committee of Arrangements, Saratoga.

M. L. Rhein, *Chairman Local Committee of Arrangements*,
No. 7 West Thirty-eighth St., New York City.

MEETING OF DELEGATES.

Delegates to the National Dental Association, and others who may act in a representative capacity, will meet in Washington City, July 22, 1884, at the Ebbitt House, where reduced rates have been made. Reduced railroad rates may be obtained by unity of action on the part of those who will attend, from States or sections.

Everything indicates a large meeting for organization. Enough States have already elected delegates to insure a good attendance and a profitable meeting. The acceptability of the plan has been shown by the large number of favorable responses from every section of the United States.

B. H. Catching, *Correspondent*, Atlanta, Ga.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The second annual meeting of the National Association of Dental Examiners will be held at Saratoga Springs, N. Y., on Friday evening, August 8, 1884.

All boards of examiners are earnestly asked to send representatives to this meeting, as matters of great importance are expected to be brought before it.

Geo. H. Cushing, *Secretary*,
34 Monroe St., Chicago, Ill.

PENNSYLVANIA STATE DENTAL SOCIETY.

The sixteenth annual meeting of the Pennsylvania State Dental Society will be held at Wilkesbarre, Pa., commencing July 29, 1884, at 10 A. M., the sessions continuing three days.

Rates at the Wyoming Valley Hotel have been reduced from $3.50 to $2.50 per day to delegates and their families. Excursion rates are available over the following railroads: The Lehigh Valley will sell to Wilkesbarre, July 21 and 22, good to the 26th inclusive, without special orders; the Bloomsburg divison of Delaware, Lackawanna and Western will sell regular excursion tickets from all stations on its line; the Philadelphia and Reading and Pennsylvania and divisions will sell special tickets over their lines; orders for which, or other information, can be obtained by addressing

W. H. Fundenberg, *Corresponding Secretary,*
No. 958 Penn avenue, Pittsburg, Pa.

MISSOURI STATE DENTAL ASSOCIATION.

The twentieth annual meeting of the Missouri State Dental Association will be held at Sweet Springs, Mo., commencing Tuesday, July 8, 1884, and continuing four days.

Reduced railroad and hotel rates have been secured, and an unusually large attendance is expected. Those from a distance desiring to attend may feel assured that a cordial welcome will be extended to them. For programme and other information, address Dr. G. W. Tindall, chairman executive committee, No. 1108 Main street, Kansas City, Mo.

G. W. Tindall,
S. B. Prevost,
E. E. Shattuck, } *Committee.*

NEW JERSEY STATE DENTAL SOCIETY.

The fourteenth annual meeting of the New Jersey State Dental Society will be held at Asbury Park, N. J., commencing at 10 o'clock, Wednesday morning, July 16, 1884, the sessions continuing three days.

Several papers of general interest to the profession by members and eminent practitioners of sister societies will be read. Every inducement will be given inventors for furthering the exhibition of anything new or useful to the profession, by consulting Dr. J. W. Scarborough, Lambertville. The headquarters will be at the Coleman House. A large hall, open on all sides, is connected with the hotel for meetings. The profession generally, members or not, are most cordially invited to attend.

Chas. A. Meeker, D. D. S., *Secretary,*
Newark, N. J.

MINNESOTA STATE DENTAL SOCIETY.

The first annual meeting of the Minnesota State Dental Society will be held in St. Paul, on the third Wendesday in July (16th), 1884.

A special effort is being made for an interesting meeting, and a large attendance is expected.

T. E. Weeks, *Corresponding Secretary,*
301 Nicollet Ave., Minneapolis, Minn.

NORTHWESTERN DENTAL ASSOCIATION.

THE Northwestern Dental Association will meet in Grand Forks, Dakota, July 22, 1884, at 10 o'clock A. M.

S. J. HILL, *Secretary*, Fargo, Dakota.

DENTISTS' BENEVOLENT ASSOCIATION.

THE first annual meeting of the Dentists' Benevolent Association will be held at Sweet Springs, Mo., on Thursday, July 10, 1884.

This association is composed exclusively of dentists and dealers in dental materials, and has among its objects the financial aid and relief of the families of its deceased members. Every member of the profession is or should be interested in such a movement, and all are cordially invited to attend this meeting. As the meeting takes place during the session of the Missouri State Dental Society, arrangements have been made for reduced railroad and hotel rates. Those desiring to attend are requested to communicate with the secretary.

R. I. PEARSON, *Secretary*,
No. 2206 Troost avenue, Kansas City, Mo

EDITORIAL.

THE POWER OF STATE BOARDS OF DENTAL EXAMINERS.

THE Supreme Court of Illinois has recently made a decision which concedes to the State Board of Dental Examiners discretionary power to determine the status of a dental college and the value of its diploma. The act to regulate the practice of dentistry in Illinois makes it unlawful for any person who was not at the time of the passage of the act engaged in the practice of dentistry in that State to commence such practice, unless he shall have received a diploma from the faculty of some reputable dental college duly authorized by the laws of one of the United States or by those of some foreign country. Another provision of the act prohibits any person practicing dentistry in Illinois without a license from the State Board of Dental Examiners, except such as are properly enrolled as having been practitioners at the time of the passage of the act. Another section of the same act provides for examination before the board of examiners of all applicants for license to practice dentistry, but declares that said board shall issue license to any regular graduate of any reputable dental college, without examination, upon the payment of a prescribed nominal fee.

Isaac Sheppard, a graduate of the Indiana Dental College, having been refused a license to practice by the State Board of Dental Examiners, on the ground that the college whose diploma he held was not a reputable institution, petitioned the Supreme Court for a writ of mandamus to compel the board to recognize the diploma and issue a license to him without examination. The petitioner claimed that the board has no power to decide what is or what is not a "reputable dental college;" that the law defined it to be one "duly authorized by the laws of this State or some other of the United States or by the laws of some foreign country, in which college * * there was at the time of the issue of such diploma annually delivered a full course of lectures and instructions in dental surgery."

Judge Scholfield took the position that by the use of the term "reputable" the General Assembly meant to express an addition to the other requirements in regard to the college; that, as it was known that there were colleges authorized by the laws of States in which they were located that were not "reputable," because they frequently graduated for money without reference to scholarship, it was against the diplomas of such colleges that the law was intended to protect the public, and therefore it required that the colleges be "reputable." The court explained that whether a college be reputable or not is a question of fact to be decided by the board; that the responsibility of investigation, judgment, and discretion,—of ascertaining and determining the facts,—rested with it, and that no other tribunal was authorized to review, set aside, or confirm the exercise of that discretion by the board. The board having decided that in its judgment the curriculum of study and requirements for graduation of the Indiana Dental College were not such as to entitle it to be classed as a "reputable" dental college, the petition for a mandamus was therefore denied.

That State boards should have judicial power to determine questions of fact is, we think, essential to the carrying out of the legislative intention in the enactment of laws to insure the better education of practitioners of dental surgery and to regulate the practice of dentistry, and the profession is to be congratulated upon the legal confirmation of their powers in this respect.

Whether the Illinois State Board of Dental Examiners, in the exercise of its discretionary power, acted wisely or not in rejecting the diploma of the Indiana Dental College as a satisfactory evidence of proficiency for practice, is a question about which there will be a difference of opinion. Probably a large majority of the profession, certainly a majority of those interested directly in educational matters, will approve their course. The ground of the refusal of the board was that the Indiana college, although it prescribes regular courses of study, does not require actual attendance upon its lectures before graduation, but grants diplomas on evidence of the fitness of the candidate to practice as determined by examination, without reference to when or where the fitness was acquired. The board contended that such power is dangerously liable to abuse. Its action was in accord with the resolution adopted at the meeting of the National Association of Dental Examiners, which enjoined its members to "accept the diploma from no college which does not require two full regular courses of lectures, or its equivalent—one full course and five years' practice—previous to granting such degree." It is also in the spirit of the standing resolution of the American Dental Association on the same subject, which debars dental colleges from representation in that body unless they require attendance on two full regular courses of lectures before graduation.

OBITUARY.

DR. LYON BERHARD.

Died, in New York City, April 20, 1884, after a lingering illness, Dr. Lyon Berhard, in the seventy-third year of his age.

Dr. Berhard was born in the city of Amsterdam, Holland, in December, 1811. He early adopted dentistry as a calling, and spent many years in traveling and the practice of his profession. He settled in New York over forty years ago, and during most of the time since had practiced dentistry in that city, where he had many friends among his countrymen, and particularly among the Hebrew churches and institutions, in whose welfare he always took a special interest. He was of a charitable disposition, and faithful in his relations to his friends and his family.

PERISCOPE.

Accidents Occasioned by the Eruption of Wisdom Teeth.—Considered in a general manner, the accidents occasioned by the eruption of a wisdom tooth are very numerous.

A methodical division of the phenomena is not an easy thing, and very often an accident of a certain nature at the first appearance modifies itself to pass into and through other successive forms.

However, as a classification is necessary to the description, we have adopted the following:

1. Inflammatory accidents, subdivided into accidents of the mucous membrane, and accidents of the bony structures.
2. Nervous accidents, pain in the nerves, troubles in organs of some special sense, and reflex phenomena.
3. Organic accidents, which include the follicular cysts of the wisdom teeth, the odontomata, and new formations.

First, inflammatory accidents.

The mucous accidents connected with the eruption of wisdom teeth are extremely frequent. They commence with a simple irritation of the gums, and finish with an abscess, ulceration, or gangrene. Sometimes, however, the local accident is isolated; sometimes there is a complication of disturbances of the neighboring parts more or less intense.

In all cases this mucous form of accidents is, of many, the most common, for in the statistics given by Dr. David, of seventy-five accidents due to eruption, it represents a proportion of seventy observations, which gives in the sum of various accidents the proportion of about 93 per cent.

In the most simple cases the mucous membrane of the region of the wisdom teeth is merely lifted, moderately swollen, and tender. The accident, without passing unperceived, causes only a slight pain, and the tooth shortly overcoming this obstacle, appears above the gum in the midst of some shreds having about the aspect of proud flesh. The pressure of these shreds, which remain for some time on the chewing surface of the tooth, causes invariably the formation of certain pouches which become filled with foreign matter and débris of food, and thus become true centers of production of caries.

It is by this process that they cause premature injuries to wisdom teeth to such a degree that some inattentive observers have asserted that wisdom teeth often erupt in a carious condition.

In a more pronounced stage of the inflammation of the gums, the portions of mucous membrane lying upon the tooth are the seat of the true abscess, at the centre of which the tooth itself is found, which remains thus imprisoned without communication with the exterior. It is to this form of accident that Chassaignac has given the name, *encystment* of the wisdom tooth, to distinguish it from the preceding form, which he calls encasing.

This distinction, which seems a little too fine, is in other respects wholly artificial; for the first form ordinarily blends with the other, when, after the spontaneous or intentional opening of the abscess, the enclosed tooth finds itself in communication with the outside.

The phlegmonous form consists of a true follicular abscess, and in this case the local accident most commonly extends itself to the neighboring parts. Sometimes it is an inflammation of the gums, which extends forward along the border of the gums, and sometimes even to the median line. Sometimes it is an inflammation of a gland, whose particular character is that of extreme persistency as long as the cause remains unknown. Toirac mentions a very remarkable observation concerning it by Dr. Fiard. From the glands, the inflammatory process extends itself to the soft palate and to the pharynx, giving place to an equally obstinate inflammation.

Be it as it may, this form of accidents is altogether peculiar to the inferior and superior wisdom teeth.

In the inferior jaw, the simple eruption of a tooth, otherwise normal as to volume and direction, may be its cause, while in the upper jaw it produces only that condition when the wisdom tooth is directed abnormally either outside toward the cheek or backwards toward the anterior part of the palate. It is, moreover, generally to this form that the troubles confine themselves, as we have remarked. To the phlegmonous form which we were indicating, and now and then also to a simple inflammation of the gums, the ulcerous state often succeeds. One sees then, on a level with the torn shreds of the mucous membrane, or as a consequenee of the opening of the follicular abscess, some irregular ulcerations with grayish bottom, covered with shreds of epithelium, which give the aspect described under the name of ulcero-croupous stomatitis.

The seat of these ulcerations is the region of the border of the gum around it; quite often it is the mucous membrane of the cheek; more rarely the seat of ulceration is on the tongue, when the wisdom tooth has a direction inwards. In every case the ulcerous variety is that which we have indicated elsewhere, in speaking of inflammation of the gums proper, as representing for a certain number of authors and for ourselves the true nature of ulcero-croupous stomatitis as occuring among the soldiers and in general among young subjects at the age of the eruption of the wisdom teeth.

The mucous accidents of wisdom teeth comprise, then, as one sees, three varieties: the simple inflammation of the gums, the phlegmonous inflammation of the gums, and the ulcerous variety.

But this is not all. In these three varieties, more especially in the two last, there are produced ordinarily some complications in the neighboring parts. The most frequent is the inflammation of the submaxillary gland. It appears almost infallibly when the local inflammatory phenomena take a notable intensity of a certain duration. This adentis, particularly persistent in the ulcero-croupous form which has been described as occurring among young soldiers, as the consequence of the pressure of the collar or other special cause, appears in our opinion as belonging to the series of accidents of the wisdom teeth. This glandular inflammation, considered as a complication of an accident of the mucous membrane, will have, nevertheless, for its exclusive seat the sub-maxillary glands for the inferior jaw and the parotid glands for the superior. The cervial glands themselves become swollen only when the morbid phenomena have invaded the bony tissues of the jaws. From glandular swelling to inflammation properly there is only one step, and this new complication is very frequent. Here the inflammation appears under the different forms which we have designated as a simple œdema, circumscribed abscess, and diffused abscess, according to the extent of the original injury. We may say that in an accident of the mucous membrane the œdematous inflammation is the most common complication.

The phlegmonous form belongs to the cases of severe inflammation of the mucous membrane, or to those particular cases in which an inferior wisdom tooth finds itself inclosed in the soft parts of the cheek, where it determines ulcerations, indurations, and fungous growths, in the midst of which the tooth may be found incased.—*Dr. E. Magitot, in Le Progrès Dentaire, translated by L. L. Brooks for the Western Medical Reporter.*

Cancrum Oris.—Charles L., aged 12 years, was admitted into the hospital on January 31. He had first noticed a blackish lump on the right side of the mouth, close to the bicuspid, a week ago. This has gradually spread. He has had a disagreeable taste in his mouth, and the odor from the lump has been very fetid. Four days ago he went to see a medical man. He has no idea what started the disease.

On admission, the gum on the right side of the lower jaw was spongy and ulcerated, and opposite the first molar it was gangrenous, and covered with a grayish slough, more extensive on the inner than the outer side of the gum; it did not extend beyond the reflection of the mucous membrane from the jaw, on to the tongue; several of the teeth were loose, and painful when pressed upon. Strong nitric acid was applied, the patient being under chloroform.

February 1. The cauterized part had assumed a brownish-yellow color, with very little redness or swelling around; early in the day there was little or no pain, but towards evening pain came on, and opium had to be given internally, while glycerin and belladonna were applied externally.

February 2. The lower lip was swollen, and the gum about the incisors dark red, and covered with a grayish slough; the tongue remained healthy. The glands, both in front of and behind the sterno-mastoid muscles, very tender.

By February 7 the ulcer had extended considerably; it was in a sloughy condition, and its base very tender. The under surface of the tongue and the mucous membrane of the cheek were now implicated; the cervical glands much swollen and very tender. The temperature ranges between 101° and 103·8° F. He was fed from a tube. Mr. Heath had the patient put under chloroform in the afternoon, and carefully scraped the surface of the ulcer with a sharp spoon, and then applied the actual cautery, the mouth being afterwards washed out with glycerin and carbolic solution.

On February 10 the sloughing was found to be again extending; he had had his mouth swabbed out at intervals with glycerin of carbolic acid, and had used a gargle of chlorate of potash. There was noticed yesterday a copper-colored papular rash on both buttocks, and on the lower part of the legs. His chest was carefully examined, but, beyond a little rhonchus, nothing abnormal was found.

February 12. The sloughing in the mouth was extending, his tongue was raised, and pushed backwards and upwards, and was rather swollen.

February 15. The boy begins to be very anæmic. His blood was examined for organisms, but none were found. On counting the corpuscles, there seemed to be a diminution in the number both of the white and the red.

February 16. Condition remained about the same. The blood was again examined; there was an excess of white corpuscles, many of which were undergoing fatty degeneration; some of the red discs were breaking down; the blood when fresh drawn had a thin, watery appearance; there were still no organisms.

February 18. The patient passed a restless night; he was constantly crying out; refused nourishment; now he lies in a semi-conscious condition, very much exhausted. The lips are covered with dark sordes. The blood is still more watery in appearance, and coagulates feebly. In ten squares of the hæmocytometer there were only forty-five red and eight white corpuscles. Under the microscope no organisms were detected; the white corpuscles appeared larger than normal; some showed amœboid movements, and some granular fatty degeneration. Death.

Remarks by Mr. Victor Horsley: In the foregoing case there are two points of interest. (1) The continuance of the disease, and (2) the immediate cause of death. As for the first, it may be fairly assumed, in view of the most recent observations of the necrosis of tissues following the growth of organisms in the same, that the cauterizing agents failed to reach the foci of development of the parasite, and that the disease simply spread unchecked. Microscopically, however, the spreading border of the gangrene simply exhibits œdema, and infiltration of the loose tissues with leucocytes, and I have only been able to demonstrate the existence of bacterium-termo in those parts which were putrid during life. (The *post-mortem* was performed within half an hour after death, and the tissues were put into absolute alcohol.) As negative evidence this fact is of course worth very little, and it is only mentioned here in the hope that other cases will be examined in the same direction.

The cause of death appears to have been a simple case of sapræmia, the excessively foul condition of the ulcerated mouth affording constant and large supplies of sepsin, which was swallowed by the patient in considerable quantity, even soon after his admission. The certain absence of organisms in the blood during life, and the whole *post-mortem* appearances point in the same direction. In connection with the latter it must be remarked that the ulceration of the cæcum is a very slight representative lesion, when the results of experimental sapræmia are remembered.—*University College Hospital Reports, in Medical Times and Gazette.*

Influence of Micro-Organisms in the Production of Dental Caries.—Mr. Arthur Underwood read a paper on the "Influence of Micro-organisms in the Production of Dental Caries." He referred to a paper read before the Dental Section at the International Medical Congress, in 1881, in which he had shown that certain forms of micro-organisms were invariably present in carious dentine; that no change resembling caries could be produced in the absence of these organisms, *i.e.*, under aseptic conditions; and that under septic conditions a change could be produced artificially which, if not undistinguishable from ordinary caries, certainly resembled it. The fact that organisms were invariably present had since been confirmed by numerous observers. It had been stated by one investigator (Dr. Miller, of Berlin) that the dentine was first softened by acid, the invasion of the micro-organisms being only secondary to this, and that a zone of softened dentine not infected with organisms always existed in advance of that which was so infected. He and his colleague, Mr. Milles, had on the contrary found that the organisms extended as far as the softening; they could not find any softened tissue which did not contain micro-organisms, and they were of opinion that the acid which softened the dentine was produced by the organisms, just as occurred in ordinary processes of acid fermentation. They had cultivated the various organisms found in carious dentine in flasks containing purified blood serum, after the method introduced by Professor Koch, and had ascertained that there were several distinct varieties, but experiments made with the view of finding out which of these species were the most active agents gave negative results. Dr. Miller had stated that he had produced artificially out of the mouth caries which he defied any one to distinguish from that which occurred in the mouth. Messrs. Underwood and Milles had repeated his experiments, and had tried several of their own with but very partial success; the result was that in the absence of germs no change takes place which could be supposed to be caries; in the presence of germs a change does take place resembling caries, but which invariably became arrested before it had gone very far. This comparative failure was no doubt caused by the difficulty of assembling in a flask or incubator experiment all the various conditions which were present in the mouth, and instances were quoted from the experiments of Koch, Pasteur, and Nægali to show that micro-organisms cultivated under conditions not altogether favorable became weakened, and even lost their special attributes, so that the bacillus of anthrax, for instance, could be inoculated harmlessly. The authors of the paper claimed to have established that micro-organisms of a special form were an essential element in the production of dental caries. Food gets lodged between the teeth, and undergoes fermentation, with formation of acid and bacteria; the acid destroys the enamel, the micro-organisms invade the dentine, proliferating in the tubes and living at the expense of their organic material, their advances being accompanied by decalcification of the intertubular substance.

A discussion followed, the tone of which was distinctly favorable to the adoption of the views promulgated by Messrs. Underwood and Milles. It was remarked that these cleared up some points which the purely chemical theory of caries did not explain, *e.g.*, the fact that the dentine was destroyed more rapidly than the enamel, and a hope was expressed that the discrepancies at present existing between the results arrived at by Messrs. Underwood and Milles and by Dr. Miller might soon be settled by the testimony of independent investigators.—*Proceedings Odontological Society of Great Britain, in Medical Press.*

LARGE SALIVARY CALCULUS.—Salivary calculi are not of very rare occurrence. A tumor under the tongue, on one side of the frænum; a dilated duct from the submaxillary gland full of fluid, and called ranula, might contain calcareous deposits. But very rarely have we the opportunity of reporting a calculus of such magnitude as the one which I extracted from the mouth of a patient two months since. I herewith append a report of the case:

Mr. W., aged 73, consulted me for a glaucomatous trouble. During the consultation he desired to know whether his defect of vision could be aggravated by a disease of long standing in the mouth. In inspecting this cavity I found a large swelling under the tongue, on the right side of the frænum. It was a very prominent elevation, on the floor of the buccal cavity, extending from the inner face of the chin toward the root of the tongue. Its nature was apparent at the first glance, for at the anterior and upper part of this large, round, fleshy mass was an opening one-fourth of an inch in diameter, through which could be seen the exposed surface of a salivary calculus. A probe passed in through this opening entered into a large cyst, the thickened and distended duct of Wharton, which was filled with a solid calcareous mass. With scissors I slit up the cyst wall, and removed from its bed a very large calculus of brownish-white color, which weighed, when thoroughly dried, 159 grains. It was pear-shaped, the stem or contracted part having been molded in the less dilated posterior part of the salivary duct. The calculus was 1⅝ inches long, ¾ of an inch broad at its largest end, and ⅜ of an inch near its most contracted end.

A thread passed around the stone in its longest diameter measured 3⅝ inches. The circumference at the thickest part was 2¼ inches, and 1¼ inches around its most contracted portion or stem. The surface of the stone was rough. It could be easily cut with a knife, the section showing a laminated structure. A drop of acid upon the surface caused carbonic acid to bubble up, showing that carbonate of lime entered into its composition. Chemical analysis showed that phosphate of lime was the chief constituent. The tumor had annoyed the patient for a long time. Its peculiar nature was not suspected till revealed by ulceration of the sac.—*J. J. Chisolm, M. D., in Jour. American Med. Association.*

Salivary Calculus.—Mr. Puzey showed a specimen of a calculus which had been produced in the duct of the submaxillary gland. The latter was also shown. The patient was a female aged forty. Eighteen months ago Mr. Puzey removed a mass of tubercular glands from the axilla, the patient having also a swelling under the jaw, and scars on both sides of the neck. Three weeks ago she was re-admitted. The swelling under the jaw had suppurated, but was healed. Mr. Puzey removed it, when it was found to be the submaxillary gland, containing in its main duct a calculus composed of earthy phosphates, measuring 1½ in. by ⅞ in. by ⅝ in., and weighing 108 grains. The lump could be easily felt from the floor of the mouth, but not the stone, which was almost buried in the gland. Subsequently it was ascertained that on some occasions a discharge of pus and blood into the mouth had taken place.—*Proc. Liverpool Medical Institution, in British Med. Jour.*

New Method of Treating Salivary Fistulæ.—At the meeting of the Société de Chirurgie, held July 5, M. Delens read a report on a work of M. Richelot on this subject. His method consists in forming an internal orifice to the fistula by tying the thickness of the cheek in the grasp of an elastic ligature. After the ligature has cut through, the external orifice closes of itself, while the other remains open.—*Le Progrès Med., Can. Jour. Med. Sci.*

HINTS AND QUERIES.

In answer to J. F. H., in the Dental Cosmos for May, 1884 ("Hints and Queries"), I will state that my way of giving a high polish to amalgam fillings is by first smoothening them as well as possible, while in a soft state, with cotton or spunk. When set I finish them off, first, with pumice on hard rubber disks, or wooden points in the engine; next, with precipitated chalk on felt disks or points;

and, last, I burnish them with either hand-burnishers or engine corrugated burnishers. By this means it is possible to produce the highest polish desirable.—ALEXIS DE NÉGRI, *London*, *Eng.*

FRACTURE OF GUM SECTIONS.—Concerning the breakage of gum sections, my views differ from those of "Hints and Queries" for January and May, 1883, and January and February, 1884.

I have never paid the least attention to the grinding of a perfect joint entirely through the sections, nor have I been careful to form a V-shaped space, but, after investment, I pour boiling water over the sections to free them from wax, and carefully seal the joints with oxychloride of zinc, allowing fifteen or twenty minutes for it to harden. I then vent or gate the investment freely, pack carefully, avoiding a surplus, and put the flask immediately in boiling water. I have used several grades of teeth, and always the best rubbers, and have not had a single block broken during the past five years. I therefore consider the following as probable causes of the breakage of gum sections:

1st. Using a superfluous quantity of rubber.

2d. Insufficient vents or gates for the free flow of the surplus.

3d. Closing the flasks with too great pressure before the rubber is sufficiently heated.

4th. Allowing too much of the gum border to be invested in the rubber.

With reference to the fourth cause, it is, in my opinion, never necessary for the rubber to cover the edge of the gum further than one-sixteenth of an inch, and it is always best to grind away the gum, if necessary, to obtain that result.

Pink rubber is not desirable for the joints, but, by being careful to use no more of the oxychloride of zinc than is needed to protect the joints, and giving it time to harden, the most satisfactory results will be obtained, even when black rubber is used.—G. A. V.

CONTINUOUS-GUM FACINGS.—"History repeats itself" is an adage, it would seem, more often demonstrated in dentistry than elsewhere. Twenty years ago Dr. John C. Fuller, of Chicago, obtained a patent for what he called "Combination Work," or continuous-gum facings upon rubber plates. As it was well known by many of the profession that such work had been made for several years, in various places, an article was prepared for the *People's Dental Journal*, published by myself, containing the statements of eight dentists, well known to the profession, to the effect that they had made the work from two to eight years previous, and had abandoned it as worthless; and so did Dr. Fuller soon after, and so will any dentist who uses it to any extent for a year. It has recently come to the front again, by the way of England, where it has been brought out in order to make an increased sale for the "Gas Furnace."

What are the objections to it? In the first place, in many instances, the flexibility of the rubber base will cause extensive fractures in the porcelain; and, next, when from any cause it is broken,—even a single tooth to be replaced,—the work must be taken to pieces, the continuous-gum repaired, and a new rubber plate made! A rather annoying and expensive repairing job. Most dentists would prefer to make a new rubber plate, minus the facings. It is far better to give your patients straight work, rubber, gold, or continuous-gum; and especially, if the latter, there should be no pains spared to make it as strong and as perfect as possible, for when this is done your patient has a denture that no "combination" will replace.—HASKELL, *Chicago.*

Tumor of the Jaw.—About December 20th last Mr. J. D. called to consult me about his left lower second molar, which was giving him pain. The patient was about thirty-two years of age; of bilious temperament; six feet two inches high, and weighed about one hundred and ninety pounds; had no syphilitic or scrofulous taint. I found an amalgam filling in the tooth, which had been inserted about five years previously. As it was not properly protecting the tooth, I removed the filling and excavated the cavity, which was slightly sensitive to heat and cold; but there was no exposure of pulp. I filled the bottom of the cavity with gutta-percha, and finished with amalgam. The patient returned in a week, the tooth still troubling him. The filling was perfect; no tenderness of tooth, and no sign of inflammation about it. But a gland under the ramus of the jaw was swollen the size of half a walnut. He returned again at the expiration of another week. The gland was still more swollen, and there was considerable inflammation around the adjoining wisdom tooth, which was also somewhat loose, and, as his teeth were rather crowded, I extracted it. He returned in a few days, the gland being still more swollen, and with a cauliflower growth about the size of a large bean in the socket of the extracted tooth. I cauterized the excrescence. He returned the next day with the gland now very much swollen, and the fungous growth doubled in size. I cut it out down to the bottom of the socket, which I cauterized freely. The next day the growth had again filled up the socket. I prescribed an active cathartic, poultice externally, and astringent washes, and persisted in this treatment about three weeks without any improvement in the case. I added iodide of potassium to the treatment, and watched the case for another week, when I turned the patient over to a prominent physician, under whose treatment of ten or twelve days the symptoms became more aggravated. The fungous growth was spreading around the adjacent teeth, and the gland kept increasing in size. Another physician was then consulted. His judgment was that an abscess was forming, and that as soon as it pointed prompt relief would follow lancing. Another surgeon being called on, also adopting the abscess theory, made incisions from within, anteriorly and posteriorly, but found no pus. This operation was followed by trismus. The doctor then inserted the tube of a hypodermic syringe at different points in the effort to find pus, but without success. Meanwhile the tooth which I had filled had become very loose, and the fungous growth was spreading around it and the adjoining tooth. At the earnest solicitation of the patient I accompanied him to Atlanta and called in consultation Drs. Calhoun and Holland, the former of whom declined to advise. Dr. Holland advised a tobacco poultice to overcome the trismus, and the extraction when possible of the tooth which I had filled. In the course of two days I was enabled to pry the mouth open far enough, and extracted the tooth. There was no evidence of pus, and the tooth when split open contained a living pulp. The patient subsequently consulted several prominent physicians, who pronounced the disease malignant. He then went under the care of his father-in-law, a homeopathic physician, who was confident of his ability to cure him in a few days. His diagnosis was "glandular erysipelas." The patient died on the 10th of May. I examined his mouth the day previous to his death, and found all the teeth on the affected side of the lower jaw lifted out of their sockets, the swelling extending from the left eye, which it closed, down to the clavicle.

Will some one from this record tell me what the trouble was and what would have been the proper treatment?—R. B. Adair, D.D.S., *Gainesville, Ga.*

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ORIGINAL COMMUNICATIONS.

CALCIFICATION AND DECALCIFICATION OF THE TEETH.

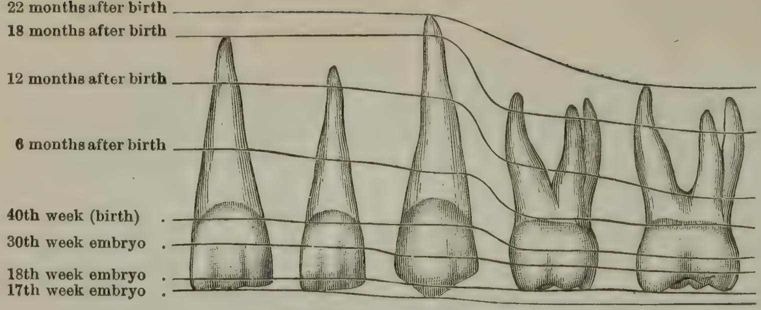
BY C. N. PEIRCE, D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society, at Wilkesbarre, July 29, 1884.)

In July, 1877, I had the pleasure of presenting to this society a paper, accompanied and amplified by a tabular statement, on the origin and progressive development of tooth-germs. This was published in the August number of the Dental Cosmos of the same year. To-day I ask your attention to a short paper, with illustrations, on the periods of calcification of the teeth and the absorption or decalcification of the roots of the deciduous or temporary teeth. In the microscopical examination of dense animal tissues, or such tissues as are impregnated with the salts of lime, it becomes evident that they, like vegetable structures, have periods of growth and of rest, which are illustrated by concentric layers or zonal shades, and that, while these conditions are normal, they are both modified and intensified by the genius presiding over the function of nutrition. Unfortunately, however, in dating the progressive solidification of tissues, we can, with a degree of certainty, mark the beginning and the end only, the intermediate lines merely approximating the conditions which we attempt to illustrate; yet they are near enough to exactness to give a comprehensive idea of the condition of the average tooth at a certain age, and in so doing they serve as an important guide in the performance of many necessary dental operations (Fig. 1).

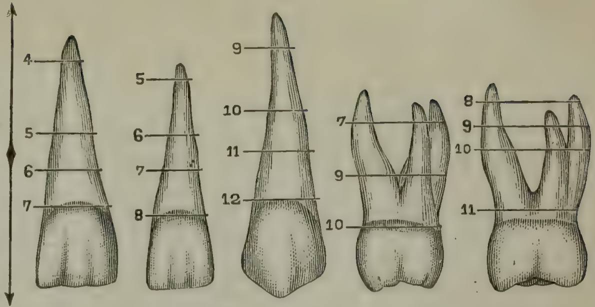
From the tabular statement or chart to which we have alluded above, we see that by the seventh week of intra-uterine life, and when the embryo is less than one and a quarter inches in length, preparation is made for the development of the enamel-germ or matrix, followed in the ninth week by the dentine-germ, these germs continuing in or through their progressive stages (as most beauti-

FIG. 1.



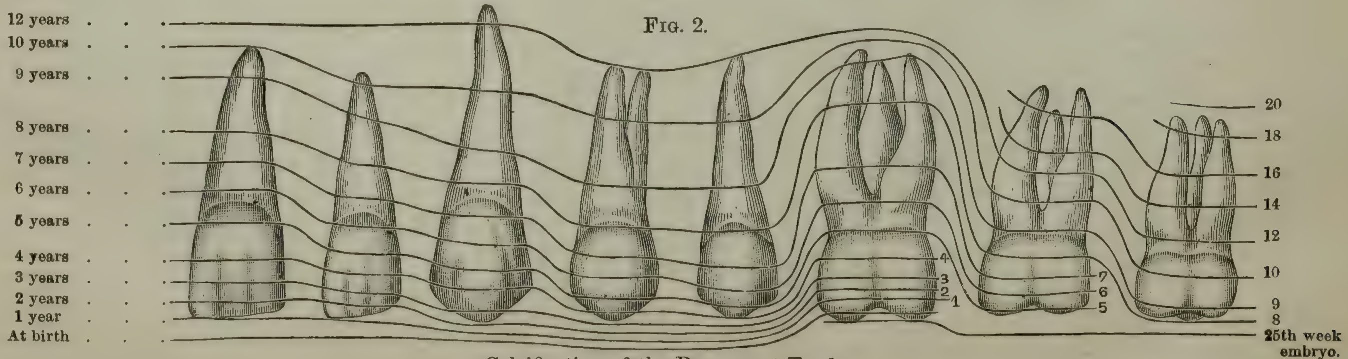
Calcification of the Deciduous Teeth.

FIG. 3.



Decalcification of the Deciduous Teeth.

FIG. 2.



Calcification of the Permanent Teeth.

fully illustrated in the articles recently published in the DENTAL COSMOS from the pen of Dr. J. L. Williams) until the seventeenth week, when we find in the incisors and cuspids the border-line between the enamel- and dentine-germs receiving depositions of the salts of lime; or, to speak more correctly, we see the formation of the odontoblast-cells and their conversion into dentine and the ends of the enamel-cells into enamel by the formation and calcification of the adamantoblasts. (This term is used by Chas. S. Tomes, as being more comparable with the term odontoblast.) By the end of the nineteenth week the same developmental process has reached the molars, and from this period until the fortieth week, or time of birth, the growth of the tooth-germs and their calcification progress simultaneously. At birth the calcification of the crowns of the eight incisors is quite complete; the four cuspids and four first molars are fully two-thirds calcified, and the four temporary second molars have their crowns for half their length solidified by the same process. At the end of the following three months the infant enters into the critical period of its life, and from a glance at the condition of the twenty deciduous teeth and their progressive developmental changes, it is fair to assume that this condition has not a little to do with the various abnormal systemic lesions or disturbances to which the child is liable at this age. In close proximity to the sharp and irregular edges of the calcifying extremity of each partial or complete tooth-crown lies the vascular papilla,—the primitive tooth-pulp,—and any want of correspondence between the absorption of the overlying gum at the coronal extremity and the deposition of solid matter at the calcifying or papillary extremity must produce, by this retarding influence, an irritation limited in its extent by the number of teeth advancing, the duration of the cause, and the ramifications of the trifacial or fifth pair of nerves and the extent of the sympathetic disturbances to which they are liable. The necessity for operation, when the irritation becomes pathological, is so unmistakable that it seems hardly necessary to remind you of the great advantage to be gained from the free use of the lance as soon as this condition becomes apparent.

Another point worthy of recognition is the period at which the calcification of the apical ends of the roots of all the teeth is completed. Not infrequently these deciduous teeth, before eruption is complete, have become a prey to rapid molecular decomposition through the agency of dental caries. Pulps are sometimes exposed while yet the root is not completed in its growth. The impropriety of resorting to the ordinary method of pulp-devitalization is, under such circumstances, very apparent. When we consider the time of calcification, it is not a matter of surprise that the crowns of the deciduous teeth are much less frequently subject to malformations and defects arising from deficiency in the quantity and quality of enamel and dentine than those of the permanent set. The crowns of these teeth are largely provided for in embryonic life, and unless the mother during gestation is in markedly poor health, so that the function of nutrition is but imperfectly performed, the fetus invariably escapes the necessary consequences of imperfect nutrition, which is so common after birth; yet if, during this important period to the embryo, there should be a prolonged attack of ill-health and systemic depression, the crowns of the deciduous teeth would give its history by deficiency in the quantity and quality of enamel and dentine.

We come now to the permanent teeth, the calcification of which is illustrated by Fig. 2. By again referring to the tabular statement above mentioned, we see that as early as the fifteenth week of embryonic life preparation is made for the development of the four first permanent molars, and following close upon these, in the sixteenth week, is the inflection giving rise to the enamel organ for the twenty anterior permanent, the successors to the twenty deciduous, teeth, and from this period until the birth of the infant the germs for twenty-four of the permanent teeth are passing through their several progressive stages peparatory to receiving the salts of lime. At birth, then, the child has not only the twenty deciduous teeth largely advanced towards calcification, but has germs of twenty-four permanent teeth, in twelve of which calcification commences the first year. The germ of the second permanent molar makes its appearance the third month, and that of the third molar the third year, after birth.

The permanent teeth, unlike the deciduous, are during the periods of calcification constantly subjected to the influence of morbid systemic conditions, and any abnormal nutritional condition, of but a few days' duration, if occurring during the period of coronal calcification, is sure to make an impression upon the crowns of the teeth, which are at the time undergoing this process, markings or defects being located at the point of calcification, and limited in extent or modified by the severity and duration of the abnormality or lesions. The principal object or advantage of Fig. 2 will be to determine the age of the child when the systemic conditions existed which have caused the faults or imperfections in the development of the teeth. If serious nutritional disturbances have occurred prior to the termination of the tenth year, some one or more of the permanent teeth must in all probability have recorded it. Another service which this illustration will render will be in determining the condition of the apical end of the root or roots in any given tooth, when beginning treatment, from pulp exposure arising either from caries or fracture, and also from partial or complete dislodgment by accident. This knowledge will in many instances aid the operator in forming his judgment as to the best methods to be pursued for the relief of his patient.

As represented by the first and second lines in the diagram, we see that the four first permanent molars and the eight incisors have, prior to the termination of the first year, all received a portion of their lime-salts, and before the termination of the third year twenty-four of the thirty-two teeth are in this process of development. The fifth year the second permanent molars and the eighth year the third molars or wisdom teeth commence calcification. With the permanent set it is rarely that the patient suffers from the effects of interrupted dentition, as is so frequently prominent in first dentition; yet at times both the cuspids and bicuspids are so retarded in their eruption by the persistence of their deciduous predecessors, or by a small and contracted condition of the maxillary bones, that serious trouble results; also, from induration of the gums or non-absorption of the anterior portion of the ramus or tuberosity, either the first, second, or third molar may be the cause of much local inflammation and a febrile systemic condition, and especially is this invariably the result of an impacted third molar. The fact that the third molars are developed during the period of childhood and youth, and while the system is liable to frequent conditions which impair nutrition, is probably one potent reason for their frequent lack of usefulness and durability.

The decalcification or absorption of the roots of the deciduous teeth is illustrated as far as practicable by Fig. 3, and in this effort your essayist has found it extremely difficult to do more than approximate the time at which this interesting and somewhat obscure physiological process is carried on. The average period at which it commences will be sufficient to indicate the time when much care will be necessary in the application of the arsenical paste for the devitalization of the pulp, and in the subsequent treatment of the pulp-chamber and root-canal. This process, usually commencing in the incisors before the close of the fourth year, progresses gradually, when normally accomplished, from the extreme end of the root towards the crown for about three years, and usually releases this deciduous crown between the seventh and eighth years, the central incisor being some months in advance of the lateral. The absorption of the roots of the first deciduous molars may be placed a year later than that of the lateral incisors, commencing about the middle or close of the sixth year and terminating with the removal of the first deciduous molars, about the tenth year; the second molars following usually some months or a year later. The cuspids, invariably the last of the deciduous teeth to be shed, have their period of absorption from the eighth to the twelfth year. While these periods would correspond with the absorption and removal of the teeth in the average mouth, so variable are they in different families that many would be widely different from the above figures.

I have just spoken of this absorptive process as being physiological and somewhat obscure. It certainly is both, and in contradistinction to the evolution of the tooth may be termed its dissolution. The evidence that it is the result of a physiological action is the fact that it matters not to what extent absorption has progressed, the very moment vitality of the pulp ceases, that instant this retrograde metamorphosis terminates. What induces this molecular dissolution it is difficult to state, though the several conditions which are always present are readily recognized; but the part they play is so obscure that it is not readily ascertained. The manner of its commencement when successful—always at the end of the root—and the presence of a vascular papilla in close proximity to the absorbing surface are, with the retention of pulp vitality, three essential accompaniments, and the absence of any one of them would militate against the completion of the process.

The statement that the presence and pressure of the permanent tooth are essential cannot be sustained, for frequently the decalcification of the deciduous tooth is successfully accomplished in the absence of its successor; and again, how often do we find the permanent tooth impacted against or within the bifurcated roots of the deciduous molar, or pressing down by the side of its single-rooted predecessor, both being more or less displaced by the persistence of the deciduous tooth without absorption. That the organ has served its purpose, and that the nourishment which had previously been appropriated by it is diverted or relegated to its successor, is probably the most plausible explanation we can give of this interesting physiological process.

This demonstration of dissolution and evolution is not alone confined to the teeth. The ramus of the inferior maxillary gives evidence of a similar phenomenon by absorption from its anterior border, with corresponding growth of its interstitial tissue, giving development and prominence to its posterior line. There are also bone-cased cavities and canals, increasing in diameter and capacity by absorption from within and addition to the surrounding walls. These, we conclude, are the results of similar physiological efforts. Roots which have long been bathed in pus, from the establishment of chronic alveolar abscesses, frequently display a worm-eaten appearance. This, though representing dissolution, is a chemical and pathological process, depending, we surmise, entirely upon the acrid condition of the pus, and is not in any case to be mistaken for the physiological process which we have above described.

In recording the periods of calcification of the deciduous and permanent teeth, it should be noted that in many instances a want of correspondence between their calcification and eruption exists. By premature removal of the gum the crown is frequently exposed, while yet there is no root-calcification, as instanced in deciduous incisors when erupted at birth—their crowns only being calcified, which is the normal condition of these teeth at this age. Again, not infrequently the persistence of the deciduous cuspids and molars, as well as of the indurated gum over an advancing permanent molar, causes delay in the eruption of the permanent teeth until after the calcification of their roots is completed. These instances illustrate that in one case eruption takes place without the development of the root, and in the other we have complete development of both crown and root without eruption.

In presenting to you to-day the periods of calcification as represented by Fig. 2, I am not unmindful that Dr. G. V. Black, of Jacksonville, Ill., had previously published in the proceedings of the Illinois State Dental Society a series of diagrams representing the same physiological process. The results of his researches so nearly correspond with those I have endeavored to give annually to the students that I have been encouraged to present them to this society with others representing the calcification and decalcification of the deciduous teeth.

SCIENTIFIC METHODS IN PRACTICE.

BY ALTON HOWARD THOMPSON, D.D.S., TOPEKA, KANSAS.

(Read before the Missouri State Dental Association, at Sweet Springs, Mo., July 9, 1884.)

The savage barbarian, as he views the manifestations of disease in one of his fellow-creatures, concludes that the victim's body is possessed by a malicious spirit or demon. The evil spirit is believed to torture the body or some of its parts by the exhibition of physical force,—such as pounding, wrenching, tearing, stabbing, burning with fire, etc.,—and the phenomena of disease, the suffering from pain, chills, fevers, etc., are the results of this torture.

Following the natural suggestions of this belief, the savage reasons that, if disease is produced by evil spirits, the thing to do is to exorcise the demons and drive them out; and from his stand-point his philosophy is a rational one and his treatment correct. His treatment consists of more or less elaborate devices directed toward the exorcism of the demon in possession of the patient and his complete expulsion. This usually comprises adjurations, ceremonies with more or less physical contortions or genuflections, accompanied by severe and often cruel treatment of the patient by the exorcist or sorcerer or medicine-man. These exorcists are a real profession amongst most wild races, and are often the only priests, and their ceremonies the only religion, of the people. Amongst the Dakotas the medicine-man, after some ceremony, sucks at the patient's affected part, and as the torturing spirit comes out and escapes at the door, men posted there fire guns at it to frighten it away. Amongst the Zulus the spirits of the dead are supposed to invade the bodies of the living and cause disease, and are to be propitiated and exorcised by the sacrifice of cattle with prescribed ceremonies. In ancient Egypt the demon was exorcised by the god Osiris being sent to the patient's house in his ark, whose approach caused the spirit to flee. In the ancient writings of Babylon we have preserved to us a prayer or formula employed for exorcism. The power of exorcism was, in ancient Greece, supposed to be a divine gift, or that it was acquired by the study and investigation of the properties of natural substances. The natural properties of drugs were supposed to be some supernatural power which substances possessed. Josephus tells us that Solomon had the power of expelling demons, and that he left his formulas. Eleazar released persons from demons by the application of a certain root to the nose, which drew the spirit out through the nostrils. He carried this valuable root set in a ring. But the history of exorcism would carry us down through all ages, even to our own days, for we sometimes hear of ignorant people in secluded portions of our own country, as well as in Europe, practicing rites for the expulsion of demons.

Once relieved of the demon, the cause of the disease, the patient, amongst savage peoples, is left to the recuperation of Nature, whom they rightly judge to be a good and wise nurse. But unfortunately for the patient, the treatment is ofttimes worse than the disease, and but for which he might more frequently recover. When he most needs rest and quiet, his aching head is racked by the beating of the drum or the gourd rattle of the medicine-man (for noise is an essential element of the performance intended to frighten away the ghost); when his bowels are swollen and painful, he is kneaded or trodden upon; when most he requires pure air and sunshine, he is inclosed with offensive skins and burning grass thrust under his nose, filling the wigwam with suffocating smoke. If he dies the demon is victorious, and has accomplished his purpose of killing the man; if he recovers in spite of treatment,—like a modern patient,—the evil demon has been defeated and driven out. But, like medicine-men in our day, his treatment often fails because of a wrong diagnosis. His premises proceed from false bases, and his philosophy in consequence falls to the ground, which reminds us painfully of his modern confrères, who often commit more egregious blunders than the savage, who reasons from a smaller capital of actual knowledge.

With the savage everything in nature is due to the willful action of spirits, and all natural phenomena are either good or bad, as they may be beneficial or harmful to man. The extent of Fetich worship for the propitiation of spirits the world over demonstrates the prevalence of the belief. Fetichism consists of ceremonies intended to propitiate evil spirits, secure their good will, and induce them to be harmless to their defenceless enemy, man. This belief prevails even amongst semi-civilized peoples, and, although their performances or ceremonies may be more mild or less vulgar, it has a no less deeper hold upon their superstitious regard. Thus, in China, Japan, and other semi-civilized countries, disease is treated by ceremonies and incantations, with the addition of the administration of mysterious and complex compounds, composed of such things as powdered lizards, ashes of snakes; cats', dogs', and horses' hairs; dragons' blood, seeds and barks of sacred trees, etc., all supposed to possess supernatural powers, and tending toward the exorcism of the torturing demon of disease.

This idea it was which gave birth to a crude therapeutics in the misty beginnings of medicine in prehistoric ages, and among peoples just emerging from barbarism. The ingredients of compounds, perhaps separately, or perhaps as compounded according to a given formula, possessed the power of exorcism, and the formula was shrouded in more or less mystery. Everything was secrecy and mystery then, secret compounds and methods and mysterious ceremonies accompanying their administration. Sometimes the mysteries of medicine went hand in hand with the mysteries of religion, and were not incongruous indeed, considering that according to the prevailing philosophies they both dealt in spirits. There were times when and nations where the priests were the only physicians, and performed the rites of both professions in the temples of the gods. Indeed, Æsclepius himself was deified and became the patron saint, as he was the founder, of a noble profession. Patients were brought to his temple and laid at his altar, where mystic rites were performed for the cure of disease.

But from the tyranny of mystery medicine began early to emancipate itself, and assume the garb of a true science. The emancipation commenced, indeed, amongst the Homeric Greeks, where medicine was, in part at least, a profession distinct from religion. The treatment of injuries, especially those of the hunt or battle, was upon natural principles, and antedated the scientific use of remedies for the treatment of disease many centuries. The Homeric heroes were all good surgeons, and treated the wounded after their battles.

In the employment of compounds for the mysterious cure of disease, observing men amongst the early philosophers noticed that certain elements in those compounds had certain and regular effects upon the human system. Some, they noted, were cathartic, some diuretic, some narcotic, etc., and that these effects could be produced at will. This discovery was the foundation-stone of scientific therapeutics, and in the history of European medicine led directly up to the Hypocratic period of clinical observation, and laid the foundations of the natural history of diseases and their treatment. Known remedies were used for the cure of disease, and by experimental research other remedies were added to the list. That was the dawn of empiricism and the beginning of the period that extends down to our own time.

Erasistratus founded the school in Alexandria (280 B. C.) which was called the empiric. They claimed that they based their observations upon the actual phenomena of disease, rejecting anatomy as useless, and disclaiming the utility of inquiring into the causes of things. They based their practice upon experience, to which word they gave a special meaning. Three sources, and three only, could experience draw from,—observation, history, and analogy. These three bases of knowledge are known as the "tripod of the empirics." They were extremely successful in practical matters, especially in surgery and the use of drugs, and a large part of the routine knowledge which they possessed became traditional in Rome, where the system flourished. Empiricism existed as a special school up to the Middle Ages in Europe, and its methods have influenced the practice of medicine down to our own times.

We claim, and often seem to believe, that we, at last, in this, the pedantic nineteenth century, have reached the scientific period, the golden age, the era of the application of exact knowledge in the methods of practice; that we are, in short, *scientific*. As we bask in the supposed dawn of this glorious age, we do not notice the lingering twilight of empiricism which yet enshrouds us; we think we see the sun, and ignore the shadow of night but slowly fleeing away. But as we indulge the hope that this is true, we cannot suppress the doubt that will arise that we are, after all, not so scientific as we could wish, or as we assume to be. We think with pain of how little exact knowledge we have, and how little of that we have is applied in a scientific manner in practice. We think of our routine work, of how we repeat the same operations day after day with the regularity and thoughtlessness of a machine, and with no consideration of the scientific principles involved. Then we doubt whether we have escaped from the long night of empiricism and the rule of mere experience; whether after all we do not reason alone from effect to cause, and blindly follow the lessons of mere experience without finding out the causes of things. That, we know, is not science. Science claims to know all things, and bids us apply her knowledge in practice. We must practice from a capital of exact knowledge in order to be scientific, and consider the day of experimentation to be past. We must reason from cause to effect, not from effect to cause. We must have all knowledge, and also the ability of its application. If we wish to produce a certain effect, we should search our *repertoirs,* find and apply the cause. That is the scientific method. It assumes the possession of the power, the means, and directs us to acquire the method of its application, and the expected effect will follow as certainly as we employ the cause.

The empirical method applies one cause (or remedy in the case of disease) after another until the desired effect is produced. It ignores the knowledge of the parts of the human system with which it has to deal, and which science has given us. It ignores a knowledge of the physiology and pathology of these parts, and knowledge even of the remedies to be employed,—a knowledge as indispensable to the scientific understanding of disease as it is to its cure. The mere savage does better than that. He has some knowledge of the parts concerned, and he has a system of physiology, and pathology, and therapeutics,—grossly erroneous, it is true, but which he knows well, and which knowledge he considers essential. The merest sorcerer or exorcist must have a reputation for knowledge and skill, or he will not be tolerated. Experimentation in the practice of his profession would not be endured. He must be scientific in his way, and he is, for he proceeds from what he considers exact knowledge. But denunciation of this obsolete school of practice would be superfluous when all men unite in condemning it, were it not that its methods are yet so persistently followed in practice. In theory, it is the science we claim; in practice, it is empiricism that we pursue.

We live in a scientific age, and scorn the imputation that we are not a scientific profession. The veriest tyro is nothing if not scientific. He does not distinguish between art and science. He performs an operation and calls it science. He does not understand that artistic ability, a trained hand, and a trained eye may be present when the knowledge of the materials upon which he works is absent. He can fill a tooth, or he can plug a hole in ivory, or wood, or stone, but he can give no explanation of the scientific history of the materials involved, showing the necessity for filling the cavity in the tooth. He cannot go back to the a, b, c of operative dentistry and give even the alphabet of the sciences involved, least of all spell his way laboriously up through the complex special sciences, until he can read his story right and give a reason for his work. And there are many such tyros amongst us. We are, indeed, all tyros, and yet we all claim to be scientific. We proclaim that *dentistry* is an artistic application of scientific knowledge to the treatment of dental diseases; but do we feel quite sure that we are entitled to the claim? Are we positive that we are escaping from the slavery and indolence of empiricism and routine? Our conscientious replies to these inquiries are anything but reassuring to our contentment and pride of attainment. We feel that we prefer ease and ignorance to knowledge and activity. But let us, for the nonce, arouse ourselves from this lethargy and indifference to knowledge; ruthlessly tear the veil from our pride, and expose what lies beneath to a critical world, whether it be good or bad.

We know that science stands like a Recording Angel over our professional work, and without mercy or favor inscribes success or failure over each and every operation coming from our hands, and brands us as hypocrites or fools as we may be dishonest or honest in the ignorant performance of our work. She writes that, even when we are successful, it is often accidental, because we are so pitiably ignorant of her laws; and when we fail, it is because of that ignorance. To illustrate, let us bring our Professional Genius into court, place him in the witness-box, and allow this Spirit of Science to interrogate, to cross-examine him, and see what he knows, and then give him a fair sentence:

Spirit of Science. "What is the operation you are performing?"

Professional Genius. "Filling a carious cavity in a tooth to prevent it from destruction by the disease."

"Why not leave it unfilled?"

"Because the disease, caries, would soon cause the loss of the tooth."

"How do you know filling will preserve it?"

"Because that is the proper treatment, and the experience of the profession has demonstrated it to be practicable and successful."

"That is empiricism. Now give me a scientific explanation. What do you wish to accomplish by filling the cavity?"

"The elimination of the disease, the cure of the parts affected, and the restoration of the lost portions; and this we accomplish by filling the cavity."

"Exactly. But you do not begin at the scientific end of the problem. You are a routinist. You do a thing because it succeeded before; but you will not work from cause to effect. Now tell me, what is caries, and what relation does your knowledge of the disease bear to your treatment?"

"Caries is mainly a chemical solution of the lime-salts of the enamel and dentine, especially the latter, by which the tooth-substance is disintegrated and lost. Upon effecting an entrance into the substance of the tooth, it destroys the tissue, in the shape of a cavity, a veritable ulcer. The operation of cleansing the cavity and inserting a substance to exclude the fluids and putrefying substances which induce the disease, is the theory of treatment, and is effective in practice."

"Very good; but is the disease cured by this operation?"

"Yes and no. Yes, because it is stopped from further progress and the tooth is preserved to usefulness. No, because the lost parts are not restored in natural substance, and the parts are never in perfect health afterwards."

"Then your science fails you. You have not the knowledge to perform a scientifically perfect operation. But, again, suppose your artistic operation fails; suppose it leaks and decay ensues again?"

"It must be repeated. But exclusion of moisture is not always necessary. Some materials require it and some do not; some teeth demand water-tight fillings, and in others they last without it."

"Why this difference?"

"We do not certainly know."

"Then your science fails you again. Now, tell me what forces, besides the solvents which you say destroy the lime-salts of the tooth, assist in the destruction of the teeth in caries?"

"Animal and plant organisms (the products of fermentation and putrefaction) and galvanic disturbances arising from acids, and their effects on various substances in and about the cavity."

"What different parts do these different forces play in the phenomena of the disease?"

"We cannot distinguish minutely between their various effects, because they are each and all more or less interdependent and mutually supporting and creative."

"Then your science fails you again, and fail you it will at every point. And yet you claim to be a scientific profession. Are not your claims sometimes unwarranted?"

"Perhaps so; but you must allow that your science itself is incomplete, and has not furnished us with all the facts."

"That is begging the question. If you are not informed of all the facts in a given case, your science is *not* a science, for it lacks exactness. Your operation is unscientific, because it is not ideal,—it does not cure the disease and restore the parts to perfect health. What defence have you?"

"My defence is that within the limits of our knowledge we *are* scientific,—that is, so far as we have exact knowledge (and we have, indeed, some) we are scientific. That you must grant. That far we work from effect to cause, and by methods that are the product of scientific reasoning."

"I grant you that within your merits; but you must then be more modest in your claims. You must remember and admit that what you *don't* know outweighs what you *do* know. You lack modesty; your claims are greater than your merits. You think you have reached the summit when you are but at the foot of the Mount of Science."

And so, throughout the ramifications of every branch of science or practice, the Spirit of Science could, by a brief category of questions, bring our egotistical Professional Genius to a place where he would needs admit his ignorance and inability to answer further. There is but one application to be made of the lesson here studied, but one inference to be drawn,—*i.e.*, the Professional Genius of the age assumes too much and knows too little. He works industriously at the chair, and produces results that excite our admiration and praise; but aside from that he does nothing. He has little leisure and less inclination for the midnight oil of study, or the pick and lens of investigation, or the test-tube and crucible of experimentation. From the chair he goes to society meetings, or writes for the journals, and vaporizes and talks, and produces nothing. He does not search for new facts. He tries to work the old ones over, and indolently presents them in a new garb occasionally, in the hope of deceiving the scientific members and astonishing the unscientific. We are wearied with the iteration and reiteration of old-established truths, or the combating of exploded theories, and often feel prone to exclaim: "How long, oh Lord, how long must thy people suffer!" We feel the need of a new and mighty Elijah in science, to arouse the profession from its lethargy and spur it on to producing something better and more worthy of its intelligence. We look over the journalism and society proceedings of the day, with their repetitions of antiquated science, the presentations of methods a generation old, the senile vaporings on obsolete principles and theories, and turn from their pages with an irresistible depression of spirits, wondering when the Moses will arise to lead us out of this Egypt and this house of bondage.

The need of the profession of this age is to *know!* It is most imperative and important that we better understand *why* we perform our operations; the *how* will follow of itself. Filling a hole in a tooth is an absurdly simple thing to do,—a mere mechanical and artistic performance; but there are few, if any, men in the profession who can explain all the scientific principles involved and give their complete scientific history. A proper knowledge of the principles in any one of our operations requires intimate acquaintance with an endless stream of sciences, all having a bearing directly or remotely upon its intelligent performance. We must *know* all these things, or we are mere routinists. We must perform our operations from a firm basis of scientific knowledge, and as there are none who have that knowledge in its completeness, it is at once apparent that the need of the profession to-day is thorough and exact scientific culture. The knowledge is the first and main thing; the execution will follow of itself, and is a mere matter of manual skill, to which any one may attain—as, indeed, far too many do—without any scientific knowledge whatever.

And here we are reminded that the art of the profession to-day is much in advance of its science,—more so, perhaps, than at any period in its history. Our practice is far ahead of the science of the parts involved in our various operations. The development of artistic and therapeutic ability has been mainly due to empirical methods, and owes little to the sciences concerned. This is a humiliating fact to our scientific pride, but it is indisputable. Experimentation rather than scientific reasoning has wrought the wonders and progress of the last generation. We have depended upon our experience more than upon intelligent investigation for our progress. We have worked materials and applied medicines until we have reached a high pinnacle of practical success; but our science has not kept pace with our growth in artistic ability. Of art and mechanics and therapeutics we have enough and to spare, and we have attained a high skill in their application,—so much so that we have outstripped our science in the race. We hear of little at the associations but art and artistic triumphs, with scarcely any science worthy of the name. We live in an artistic age, and have caught the spirit which values the artisan beyond the mere investigator of nature. The inventor claims the attention and admiration of the public, while the simple investigator who makes inventions possible is never heard of.

Partaking of this spirit, our mechanical ability has outrun our scientific attainments, and, if we have no new scientific facts added to our stock, the time will soon come when art itself will stagnate, because it will have no new knowledge to work upon. The demand of the age is for new scientific facts. We require new discoveries in exact science to carry us forward to new mechanical and therapeutical conquests. We need, and we must have, more knowledge of anatomy and physiology and pathology and auxiliary sciences, that we may achieve greater victories and be of more service to mankind.

We look about us for the men who will lead us forth in this revival of science for which we long, and we do not find them; and yet there is a new spirit abroad struggling for recognition. A little band of investigators has arisen who may be the forerunners of a re-formation, a better era of fearless investigation. We have, indeed, our Bödecker and Williams, Miller and Abbott and their peers, who are, we hope, the heralds of a new *renaissance*, the champions of a new propaganda. We need more reckless peering into nature; more daring questioning of the truth of established theories and principles; more irreverent, dare-devil iconoclasm to attack and terrify cherished opinions and prejudices, to the end that new science may be created and put into practice. Will these men and their disciples furnish us with new knowledge, or must we still reach forward with our high art and anticipate science? Must we invent new methods to meet new emergencies, or to conquer hitherto unconquered fields, and then wait for a lagging science to come forward and explain the principles which we have discovered by our crude, empirical methods? The demand of the age is for exact, unerring science. Will the men arise who can give it to us?

THE ALL-PORCELAIN DOVETAIL TOOTH-CROWN.

BY W. STORER HOW, D.D.S.

THESE crowns are designed for the roots of bicuspids and molars only, and the process of mounting them may be very briefly described, with reference to the accompanying illustrations.

FIG. 1.

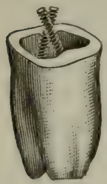


FIG. 2.

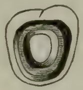


FIG. 3.

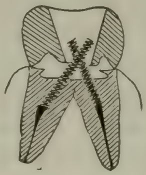


FIG. 4.

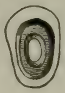


FIG. 5.

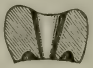


FIG. 6.

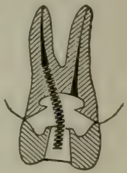


Fig. 1 shows the roots of an inferior molar after the apical portions have been filled, the neck recessed, the canals drilled and tapped, and two How screw-posts firmly fixed therein, the ends of the posts having been pinched towards each other by means of a pair of pliers, so that they will go through the central opening in the crown (Fig. 2). This opening is of a dovetail form, as shown in cross-section by Fig. 3, where the crown is seen in place over the posts on the root. It is thus made obvious that the crown may be easily put on and off the root in the process of fitting the crown-neck to the root-neck, and also that, for occlusion, the crown may be ground low on any or all sides, without destroying the dovetail function of the central cavity. When the fitting is completed, and the crown cut so short as to be $\frac{1}{32}$ of an inch distant from the occluding tooth, amalgam is packed into the neck recess, around the posts, and thinly over the cervical margin of the root, the crown put in place, and, with thumb pressure, firmly seated. Then test the occlusion, and complete the operation by packing amalgam into the crown opening, which will permit the forcing of the amalgam in all directions, to insure a firm base for the crown, and its secure dovetail attachment to the posts, as is clearly shown by Fig. 3.

The bicuspid crown (Figs. 4 and 5) is similarly mounted, as may be seen in Fig. 6, cross-section; the same crown and root being shown in contour by Fig. 7. In some instances this bicuspid crown may, like the Foster crown, be secured by a headed screw, as shown in Fig. 8. The root having been drilled and tapped and recessed, and the crown properly fitted and articulated, the screw is put through the crown, amalgam packed in the crown-groove and around the screw, which is then inserted in the root, and the crown pressed hard into its place. The screw is then turned into the position shown in Fig. 8, thus compressing the amalgam or cement in both recess and groove, after which the screw-head may be covered with amalgam, cement, or gold, as desired.

FIG. 7.

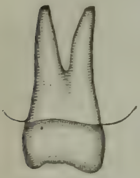


FIG. 8.

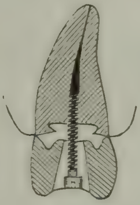


FIG. 9.

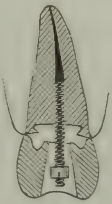
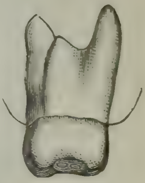


FIG. 10.



As a preferable mode, however, the screw post may first be fixed in the root, the crown adjusted over the post, amalgam packed on the root and around the post, the crown seated firmly, more amalgam packed in the crown cavity around the post, and then a nut screwed on the post, as shown in Fig. 9. In all the sectional cuts cement, amalgam, or gutta-percha is to be understood as filling the cavities in the conjoined roots and crowns.

Fig. 10 shows in contour a dovetailed crown mounted on a superior molar root in the manner shown by Fig. 3. It is obvious that the crown of Fig. 3 might be ground quite down to the post ends, and yet be firmly held by the dovetail sides of the central cavity.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

THE New York Odontological Society held a regular meeting at the house of Dr. Wm. Jarvie, Jr., No. 105 Clinton street, Brooklyn, May 20, 1884. The vice-president, Dr. Wm. Carr, in the chair.

Dr. E. S. Niles, of Boston, Mass., read the following paper, entitled

"A Study of the Salivary Glands with Reference to the Cause of Odontolithus."

Mr. President and Gentlemen: I am quite sensible of the honor you have conferred in again extending an invitation to me for the presentation of the result of my studies of salivary calculus to the profession, through this the foremost dental society of the world. Had I not directed my attention to a subject somewhat out of the every-day line of practice, the ordeal of criticism would perhaps be more formidable than I should care to encounter.

Three years ago I presented a paper to you, in which the subject of salivary calculus was treated as dependent upon systemic causes. I also spoke of the crystallography and chemistry of the formation about the teeth.

This evening I shall speak to you upon the same subject, with reference mainly to the formation and secretion of the oral fluids. I have told you that this deposit was a precipitate from the saliva, and that this was the immediate cause of a deposit about the teeth, this precipitate being accomplished as the saliva enters the oral cavity mainly by the escape of carbonic acid gas, in combination with the lime-salts which it held in solution through the closed cavities of the glands and (possibly) blood-vessels.

But the presence of lime and magnesium phosphate and carbonate cannot be regarded as evidence of normally constituted saliva. Perfectly healthy saliva contains from fifty to ninety-eight one-thousandths of these salts. It is only when the percentage is increased to twice or three times that amount that large deposits are found, and when the deposit is present we may safely presume that the fluids of the mouth are or have been overloaded with these salts. This excess may be accounted for in two ways: First, on the supposition that its presence in the blood in a varying amount is compatible with perfect health, and that a diseased condition of the kidneys checks the normal amount excreted through this channel, necessitating the vicarious action of the salivary glands. Second, on the supposition that the kidney tissues are healthy and performing their normal function, but that the circulation from some cause containing a large increase of the salts, the kidney and glands are forced to eliminate them from the body in an increased degree.

It will not be well at this time to discuss these two theories; but we will first study the glandular tissues of the oral cavity, and thus familiarize ourselves with the changes that may take place, the process of the production of the oral fluids, and the course over which the salts are supposed to travel before reaching the cavity of the mouth.

Six large racemose glands supply the greater amount of the secreted fluids of the mouth,—two parotid, two sublingual, and two submaxillary. (Fig. 1.) But the fluids of the mouth are not wholly derived from these sources, as there are numerous small glands in the superficial tissues of the oral cavity, many of which are similar in structure to the larger salivary gland. In the lips, according to various authors, there are from forty to sixty; but they are found to diminish as age advances,—are much larger and more numerous in childhood. Quite a number of these glands are situated in the cheek, opposite the third molar, at the point where Steno's duct opens. Two hundred and fifty have been counted grouped along either side of the median line of the hard palate, and one hundred and fifty-two in the uvula and soft palate; while at the base and around the edges and tip of the tongue may be counted many more (Figs. 2, 3, and 4). The minute anatomy and character of the secretion of these small glands are questions of dispute. They are similar to the large race-

FIG. 1.

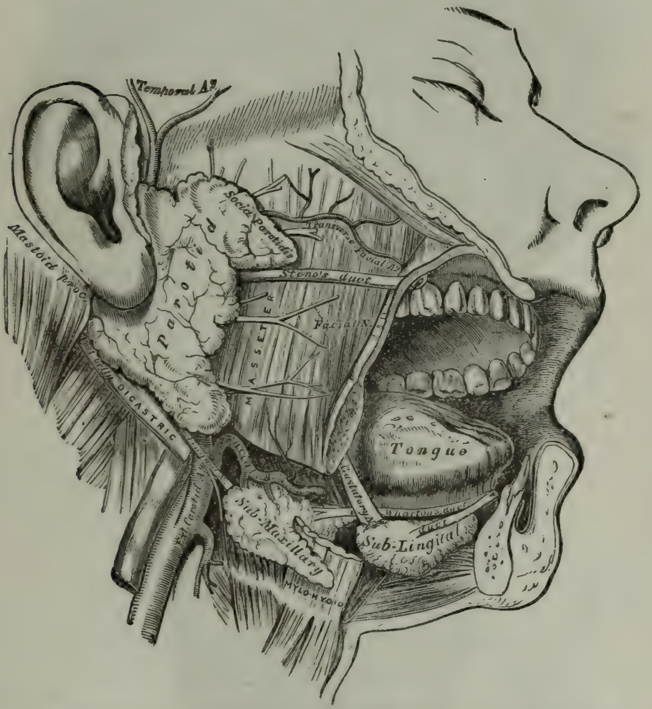


FIG. 1. The salivary glands and terminal point of their ducts in the oral cavity. (Gray.)

mose glands, and without doubt governed by like nervous connections, and contribute their share and like secretion to the oral fluid. Although the location of the deposits indicates that their main source is from Wharton's, Steno's, and the ducts from the larger glands, there is no evidence that the secretions from the smaller glands may not contribute their share.

Fig. 2.

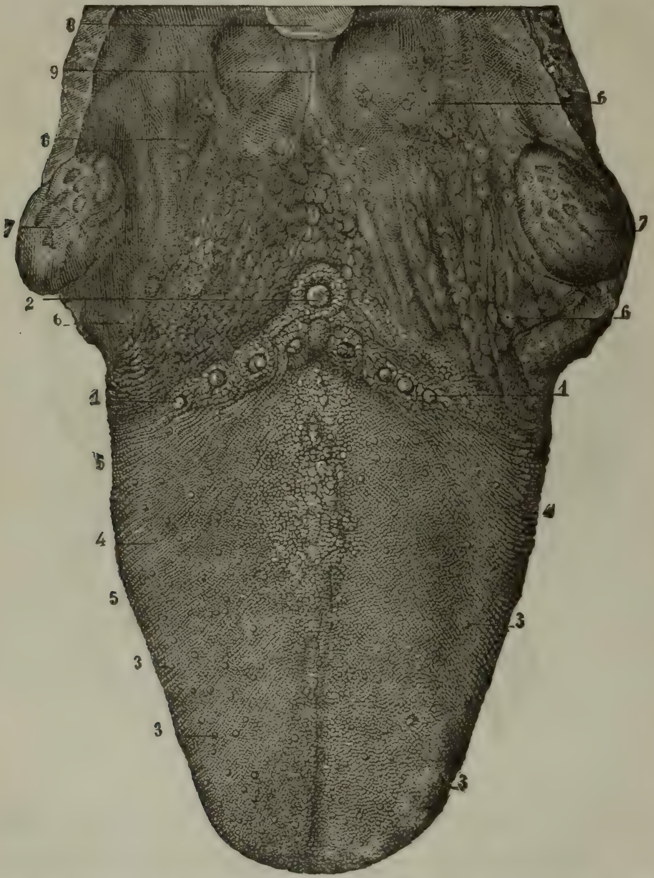


Fig. 2. Papillary surface of the tongue with the fauces and tonsils. (From Sappey.) 1, 1, circumvallate papillæ, in front of (2) the foramen cæcum ; 3, fungiform papillæ ; 4, filiform and conical papillæ ; 5, transverse and oblique range ; 6, mucous glands at the base of the tongue and in the fauces of tonsils ; 8, part of the epiglottis ; 9, median glosso-epiglottic fold or frænum epiglottidis.

Most of the observations and writings upon racemose glands have been confined to the six large glands, three of which are situated on either side of the oral cavity, and it is to these that I shall principally confine my attention. According to Gray their general anatomy may be described as follows:

The Parotid (so named from being placed near the ear) is the largest of the three glands. It varies in weight from half an ounce to an ounce. It lies immediately under the ear; is bounded above by the zygoma, and below by the angle of the lower jaw. Posteriorly it is bounded by the external meatus and the mastoid process, and exteriorly it extends to a slight extent over the mastoid muscle. The duct of this gland (the duct of Steno) is said to be about two inches in length; passes obliquely through the buccinator, and across the mastoid muscles, through the mucous membrane opening into the mouth by a small orifice opposite the second molar of the upper jaw. The direction of this duct corresponds to a line drawn from the lower lobe of the ear to a point midway between the free margin of the lip to the ala of the nose. The parotid receives blood from a branch of the external carotid, and its veins follow the same course. Nerves are supplied from the carotid plexus of the sympathetic, the facial, and the superficial temporal branch of the auriculo temporal.

FIG. 3.

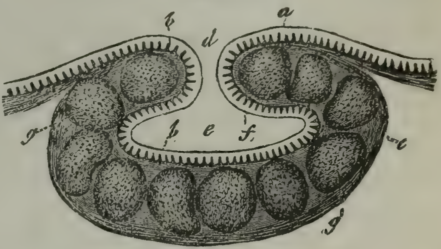


FIG. 3. Section of lymphoid crypt from the root of the tongue, 30 diameters. (Kölliker.)

a, epithelial lining; *b*, papillæ of the mucous membrane; *c*, outer part of the crypt formed of connective tissue; *d*, outlet; *e*, cavity of the crypt; *g*, surrounding follicles.

FIG. 4.

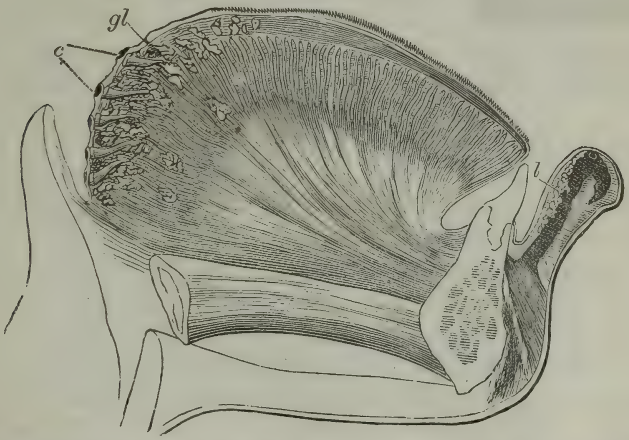


FIG. 4. Longitudinal vertical section of the tongue, lip, etc. (From Kölliker and Arnold.) *gl*, lingual glands; *c*, lymphoid crypts; *l*, section of the lip and labial glands.

The Submaxillary gland weighs about a drachm, and lies beneath the lower jaw in the anterior part of the submaxillary triangle of the neck. Its outer surface corresponds to a depression on the inner surface of the lower jaw. It is thus covered by the jaw, the platysma muscle, and the deep cervical fascia. In front it is bounded by the mylohyoid muscle, which separates it from the sublingual gland. Posteriorly, it is bounded by the stylomaxillary ligament, which separates it from the parotid gland. It is in contact internally with the hyoglossus, styloglossus, and mylohyoid muscles. The duct of the submaxillary gland is about two inches in length, and arises from the gland by numerous branches, but these soon unite to form one duct, which passes above the gustatory nerve upward and inward between the mylohyoid, the genohyoglossus, and hyoglossus muscles and sublingual gland, opening into the mouth on the summit of a small papilla by the side of the frænum linguæ. The arteries supplying the gland are branches of the facial and lingual; its veins follow the course of the arteries. The veins are supplied from the submaxillary ganglion, the mylohyoid branch of the inferior dental, and from the cervical sympathetic plexus.

Fig. 5.

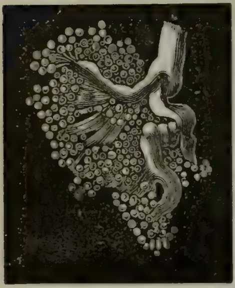


Fig. 5. Lobule of parotid gland of newly-born infant, injected with mercury. (Wagner.)

The Sublingual is the smallest of the three glands, and weighs about three drachms. It is somewhat almond-shaped in form, and is situated beneath the mucous membrane of the floor of the mouth, at the side of the frænum of the tongue, extending forward nearly to the inner surface of the jaw. It is covered above by the mucous membrane, and below is in contact with the mylohyoid muscle in front and the symphysis of the lower jaw and the opposite gland. Internally, it lies near the genohyoglossus, from which it is separated by the lingual nerve and Wharton's duct.

The ducts of the submaxillary gland vary from ten to twenty in number. They all open separately into the mouth on the elevated crests of mucous membrane caused by the projections of the glands on either side of the frænum. It is often found that one or more of these ducts open into Wharton's duct; they are called the ducts of Bartholin. The blood is supplied to this gland by the submental and sublingual arteries; the nerves are branches from the gustatory and sympathetic. When these glands are injected with mercury, and their alveoli are dilated, they resemble a bunch of grapes (Fig. 5), from which resemblance the name (racemose) has been given them. On close examination, however, these dilatations are seen to be the enlarged ends of the ducts, and in recent dissected state are somewhat flattened and elongated from lying in close proximity to each other. Internally they are lined with glandular secreting epithelium (Figs. 6 and 7), in many cases nearly filling the alveoli or glandular follicle and ducts (Figs. 7 and 8), leaving barely space for transudation of saliva to the ducts, which ducts unite to form larger and larger ones, until they make up the main excretory duct of the gland.

FIG. 6.

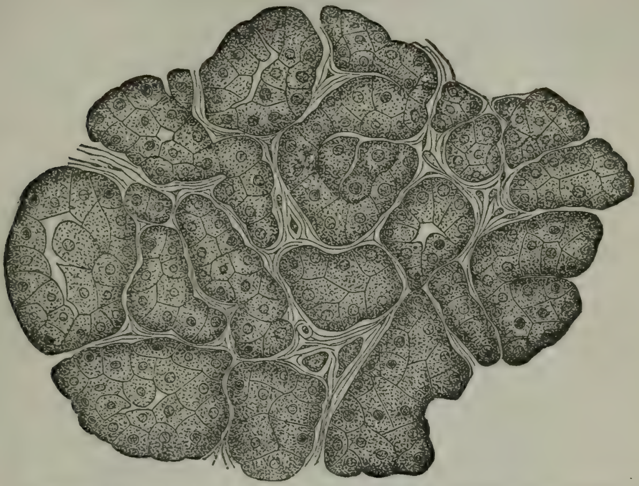


FIG. 6. Glandular follicles and cells from the submaxillary gland of the dog. (Heidenhain.)

FIG. 7.

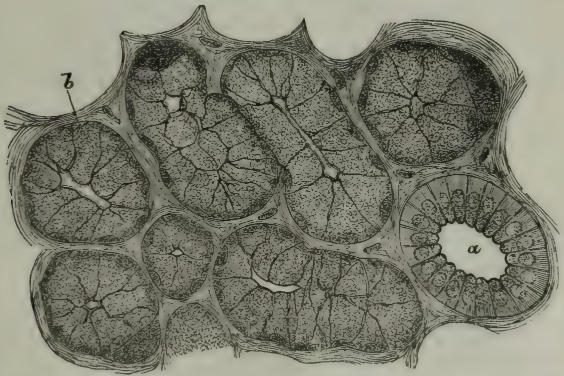


FIG. 7. Section of the submaxillary gland from the dog. *a*, salivary duct with cylindrical epithelium and central cavity; *b*, follicle with glandular epithelium and central cavity. (Kölliker.)

The epithelia in the alveoli and lining the ducts are substantially the same, and are said to be about fifteen mm. in diameter. Those in the ducts are perhaps smaller, with nucleus near the internal end of the cell (Fig. 8). Both are fine granular bodies of protoplasm, and each is provided with an oval nucleus, situated (except in those lining the ducts) at the center of the cell. The alveoli are surrounded by a delicate net-work of connective-tissue, which forms the framework of the gland, and through which are distributed the afferent and efferent nerves, blood-vessels, and lymphatics.

FIG. 8.

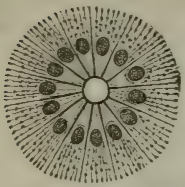


FIG. 8. Transverse section of a fresh salivary tube in diluted chromic acid of one-fiftieth per cent., magnified 480 diameters. (Stricker.)

In general, the anatomical description of one gland fairly represents the whole. The results of their physiological action, however, are somewhat different.

As a subject for comparative study and experiment, the salivary glands have been especially available in the dog, rabbit, cat, and horse; and in past years lengthy discussions regarding the innervation of the submaxillary gland have at various times been published. For this reason, without doubt, the physiological action of the salivary glands is as well known as any like function of the body.

We are all familiar with the abundant flow of saliva on the irritation of the tongue, mucous membrane of the mouth, esophagus, or stomach. Even the slight smell or thought of food will often cause an activity and a copious secretion from these glands, as well as the other glands of the mouth. By this we know that a nervous impulse has been conveyed through a channel of special sense to the nerve-center, whose office it is to preside over and excite salivary secretion, and that there must be some arrangement in the gland which readily responds to the stimulus. Undoubtedly this phenomenon is of a reflex nature, as it requires no effort of the will to cause the gland to act or the saliva to flow; nor can the action be produced by the will. The flow of saliva continues at all times in varying quantity, whether awake or asleep.

Glands are invariably supplied with three distinct orders of nerves,—ganglionic, sensitive, and motor. The submaxillary glands (Figs. 1 and 9) are supplied with one set of nerves from the cervical sympathetic, along the submaxillary artery; another from the seventh or facial, by fibers which run in the chorda-tympani, joining the lingual or gustatory branch of the fifth nerve, and diverging close under the lower jaw, to run beside Wharton's duct to the gland.

Professor Claude Bernard, of the Academy of Sciences, Paris, in experimenting upon the horse and the dog, found, after laying these parts bare and placing a tube in Wharton's duct, and dividing the conjoined lingual and chorda just above the place where the chorda leaves the lingual to run to the gland, that stimulating the lingual below the ganglion still caused a flow of saliva; but, on dividing the branches from the ganglion to the tympani and the duct, all secretion was arrested on applying the same stimulus. The submaxillary ganglion lies in the junction where the chorda-tympani nerve leaves the lingual, lying in a triangular space formed by the lingual and chorda-tympani and Wharton's duct (Fig. 9). On dividing the lingual and chorda-tympani nerves where they join, so that all connection with the brain was severed, and again irritating the lingual below the ganglion, the glands still acted and produced a flow of saliva. It was very natural for him to draw the conclusion that the ganglion produced the flow, or acted as a reflex center, where the sensory impulses may be turned into motor impulses, and thus the gland may be caused to secrete without the aid of higher centers. Among those who have repeated these experiments opinions are

FIG. 9.

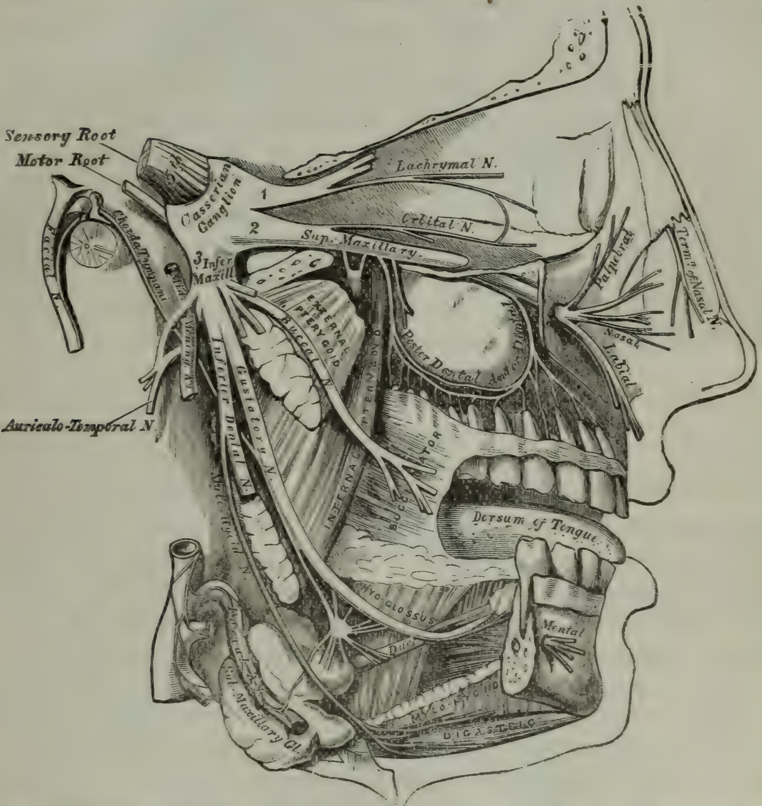


FIG. 9. Showing the distribution of second and third division of the fifth nerve; the course of the chorda-tympani nerve from the facial; its conjunction with the gustatory or lingual nerve; the submaxillary ganglion and the sympathetic connections with the submaxillary gland along the carotid artery. (Gray.)

divided. Some have successfully performed Bernard's experiments, and believe the submaxillary ganglion has the power to act independent of the higher nerve-centers.

There can be no question that the most important centers for exciting the salivary secretions are in the brain, as a copious and continued flow is produced by irritating the severed end of the lingual nerve above where the tympani nerve joins it. Further proof of this is apparent in the fact that impressions upon the optic, auditory, olfactory, and pneumogastric nerves most readily produce salivary secretion. All of these nerves (with the exception of the optic and auditory) have their origin in the floor of the fourth ventricle, and direct stimulation of the brain at this point causes salivary secretion. It may also be caused by irritating the brain-surface at various points.

The motor nerve of the submaxillary gland, or the chorda-tympani nerve (Fig. 9), arises in company with the facial in the floor of the fourth ventricle; runs with that nerve to the cavity of the tympanum, where it leaves the facial, passes between the malleus and stapes (the little bones of the ear), and finds exit from its bony canal near the Glaserian fissure. The remaining course of this nerve has been described. Nerve terminations in gland tissue, according to some observers, are traceable to the granular matter, and others claim to have traced them into the nucleus of the cell (Fig. 10).

FIG. 10.

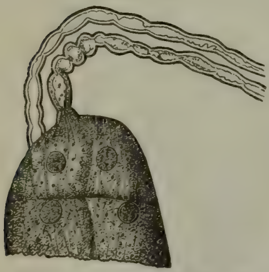


FIG. 10. From the rabbit, after macerating in iodized serum, showing the termination of a medullated nerve in an alveolus, from the submaxillary gland, magnified 590 diameters. (Stricker.)

All the evidence we have thus far considered shows that the motor connections have the power of simply calling the glands into action. We have now to study what influence is exerted by the sympathetic, which has free connection along the course of the arteries. Bernard found that, when the gland was in full action, by irritating the sympathetic nerve the flow of saliva was very much lessened and nearly arrested. This proved that, while the motor nerves caused the saliva to flow, the sympathetic checked it. It was also noticed, as the flow of saliva from the submaxillary gland was checked, that it became more viscid and ropy. This, however, was only found to be the case with the submaxillary gland. The parotid and sublingual secretions were merely checked under the same influence, but the character of the secretion remained unchanged. The peculiar action of the nerves upon the submaxillary gland has given rise to the theory that the sympathetic nerves not only check the flow of secretions, but cause the gland-cell to produce the substance peculiar to itself, by presiding over the intercellular changes, and in a measure governing the chemical reaction of the contents of the gland (Figs. 11 and 12).

Under the two nervous influences, let us see what takes place when a secretion of saliva is produced from the submaxillary gland. A sensory impulse is conveyed through the lingual nerve to the brain or the floor of the fourth ventricle. Here it is turned over to the chorda-tympani nerve, which conveys the motor impulse to the gland-cell, and at the same time a vaso-motor (or dilator) impulse causes the enlargement of the blood-vessels, admitting more blood; more material is thus furnished, and saliva is rapidly produced. Meanwhile a rapid succession of sensory impulses is sent to the brain, and motor impulses are as rapidly returned to the gland to hold it to its work. Finally the demands are met, and at this point the sympathetic nerves are given control of the glands and surrounding blood-vessels. The arteries are constricted, the blood in the veins, which during the activity of the glands was light and flowing

FIG. 11.

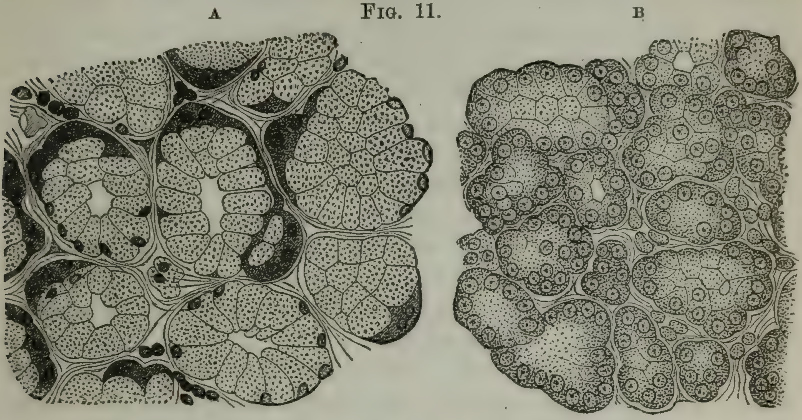


FIG. 11. Sections of the orbital gland of the dog. *A*, during rest; *B*, after a period of activity. (Heidenhain, after Laodovsky.)

FIG. 12.

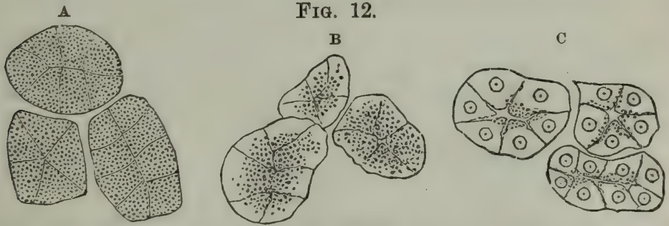


FIG. 12. Alveoli of serous gland. *A*, at rest; *B*, after a short period of activity; *C*, after a prolonged period of activity. (Langley.)

with a pulsating movement, now returns a dark venous color, and thus the gland is held in a state of comparative repose, secreting only saliva sufficient to keep the mouth moist.

It has been supposed that the salivary glands absorbed material like a sponge during the intervals of mastication, and that the pressure of the muscles and jaws during mastication caused the saliva to flow, thus filtering from the blood the already formed material for saliva. But this cannot be the case, as far as the mechanism of secretion is concerned. Although the jaws and muscles may at times help mechanically in expelling the fluids, it is not always the case, for saliva flows when all the parts are at rest. It is also found that the pressure and temperature of saliva in Wharton's duct exceeds that in the surrounding arteries; and, finally, the essential characteristic of saliva (ptyalin) is not found at all in the blood. The glands must, therefore, absorb material from the blood for the formation of all tissues, and out of this, in the recesses of their own cells, manufacture their peculiar secretions. It is to this chemical change that is due the rise in temperature.

The secretion from the parotid gland is a thin, watery fluid; that from the submaxillary is viscid; and the sublingual secretes a fluid much more viscid than the submaxillary. In saliva as a whole there is a marked variation in the mouths of different persons in regard to its viscidity. It is probable that this is due to a greater proportion of submaxillary and sublingual secretion. The quantity secreted in twenty-four hours is said to be not far from two liters, or three English pints. Mercury increases salivary secretion, and atropia lessens the glandular action. Of all the stimulants brought to bear upon salivary glands, acids are the most powerful to produce their activity—*a very significant fact.* The composition of saliva, according to the best authorities, is as follows:

Water	995.16
Albuminous matter	1.34
Potassium sulphocyanide	0.06
Calcium magnesium and alkaline phosphate	0.98
Sodium and potassium chloride	0.84
Mixture of epithelium	1.62

The reaction of saliva, when secreted in abundance, is markedly alkaline, but during the intervals it is neutral. The office of this secretion is, I believe, *first*, to neutralize the acids and protect the teeth, and, second, to assist in mastication, soften and prepare the food for the stomach, and facilitate its passage through the esophagus. On taking food into the mouth, the submaxillary saliva is the first to flow, and assists the sense of taste; following this, the parotid helps to soften and masticate the food; and lastly, the sublingual secretion envelops the mass with its viscid substance, enabling it to pass smoothly down the throat.

In this study of the secreted oral fluids, we find no evidence which would lead us to suppose that the fluids of the mouth are primarily responsible for the presence of any of the salts, and are only responsible for the peculiar chemical condition which allows the salts to be precipitated. Inasmuch as all glands are dependent upon the blood from which to draw the material for the formation of their secretions, and it being impossible for the gland-cells, by any chemical change whatever, to produce lime phosphate, carbonate, or magnesium phosphate, we are left to the conclusion that the glandular tract is practically the highway and the saliva the vehicle by which these salts are conveyed from the blood to the oral cavity.

We are confronted, then, with these questions: Is the blood overloaded with these salts? If so, is this due to kidney obstruction, or is it the waste product of diseased or overworked tissues, which are largely made up of the salts found present? These are highly practical questions, and will be the subject of a paper from me at some future time.

Discussion.

Dr. Carl Heitzmann. The doctor has touched upon a highly interesting subject,—that of secretion in general. By and by physiologists will have learned to agree on one point, namely, that everything in the body that we call secretion, and which to a certain extent involves also excretion,—the elimination of effete material,—is done by the epithelia. These are the offspring of the epiblast and hypoblast that partly cover the external surface and partly line all the cavities directly or indirectly connected with the outer surface of the body. Attempts were made five or six years ago to show that the secretion of the milk is performed in some way by the migrating cells,—so called leukocytes. But we must abandon such views, for we can now directly prove, in many instances, that the secretion is the work of the epithelium. When Heidenhain first published his remarkable experiments on the changes of the epithelia everybody was surprised. He demonstrated that the epithelia of salivary glands in starving dogs swelled to an enormous extent; the portion nearest to the caliber looked structureless, and the portion nearest to the connective-tissue, at the basis, appeared coarsely granular or nearly homogeneous. After feeding the dogs, whereby the accumulated saliva was emptied, or if the salivary glands were irritated by electricity, the epithelium looked uniformly granular, as we are accustomed to see it under the microscope. In the former instance the caliber was not discernible; in the latter it was perfectly plain.

Heidenhain justly concludes from these facts that in the first instance the epithelia were loaded with the saliva, and in the second instance that they were rid of secretion. He did not fully appreciate the anatomical facts, but certainly to him is due the merit of having first drawn the attention of physiologists to this remarkable fact. A little later, about 1879, Dr. S. Spina and Prof. Stricker, in Vienna, made experiments in order to prove the active participation of the epithelia in the process of secretion, by means of direct electric influence, under the microscope. The best of those experiments were made with the so-called nictitating membrane of the frog. This membrane, being excised from a freshly-killed frog, was brought under the microscope with some indifferent liquid, such as the serum of the frog's blood. A few strokes of the Faradic current sufficed to produce a remarkable swelling of the epithelium under their very eyes. As soon as the current abated the epithelia gradually went back to their original shape. Last year, while in Vienna, I witnessed these experiments. Professor Spina was so kind as to show me his method of applying electricity on a living mucous membrane. That there is such an active change in the epithelia, there is no doubt in my mind; but there can be a doubt as to his conclusions and his interpretation. Spina is of opinion that the expansion of the epithelia, after irritation by the electrical current, is due to the taking in of liquid from without. He concludes that this expansion is the active process of protoplasm. He overlooked one fact, that whenever such a hyaline mass is bulging forth from the epithelia, invariably the distal end of the epithelia, when looked at with a power of 500, is seen to be coarsely granular, and therefore in a state of what we call contraction. I drew the attention of Professor Spina to this point, and he admitted it substantially; but he did not wish to yield his position, which is different from mine. I have studied the process of secretion for a number of years in different glands, and I came to the conclusion that among the many varieties of secretion we have the right to assume but three main types, and those are, first, the watery; secondly, the mucous; and, thirdly, the fatty secretions. All other secretions might be arranged under one of these heads, presenting perhaps sub-varieties. The watery secretion we have represented in our bodies by the lachrymal and the sweat glands. Unfortunately we have no means of tracing the process of watery secretion under the microscope, for water, as such, is not visible. We merely conclude that such watery secretions are discharged from the ducts in the way we see it in simple protoplasmic bodies, such as amœbæ, which have taken in a certain amount of foreign substance such as carmine or aniline. It is done with a certain force; and we must conclude that a temporary opening has been made in the covering layer of such protoplasmic body. Judging from the force of the discharge of such foreign bodies, we conclude that water also has escaped from the interior, without, however, injuring the further vitality of the whole body. It seems to me most probable that the watery secretion is based upon the same principle, for we know that every epithelium is surrounded by a thin layer of the cement-substance which envelops and protects it. Daily observation teaches that water, before it reaches the surface, must necessarily pass the epithelium in order to get into the caliber of the gland. We may, therefore, conclude that the epithelium at a given point will be loaded with water, and of course a certain amount of salts, to such a degree that the cement-substance bursts and the water is discharged from the interior of the epithelium. This discharge is not an active expansion, as Spina thinks, but a contraction of a portion of the epithelial body distant from the expanded one. I would term the contraction an active process, but not the expansion. There is nothing strange in the idea that such bursting takes place, and we know that after a certain quantity of liquid has been emitted from the interior of the epithelium the protoplasm does not lose its vitality at all. Mucous discharge is best represented by the salivary glands. Some salivary glands produce merely a kind of serous liquid, as the parotid, whereas others produce a more viscid secretion, as the sublingual. The process of the formation of mucus can be seen, under the microscope, best in the epithelium which we obtain from the intestinal canal of a freshly-killed frog or rabbit. If we examine the mucous surface of such a small intestine, after placing it under the microscope, we recognize the epithelium with great distinctness. By adding some liquid,—dilute bichromate of potash, or dilute chromic acid,—we notice that a great many of the epithelia become swelled; some of them to an extent which surpasses three times the original size of the epithelia; and the cement-substance overlapping the epithelial bodies must necessarily distend. Presently we see bulging forth on the top of that body a portion of the epithelium. Suddenly a rupture takes place, and there issues out a pale and nearly structureless mass, as a rule globular in form, and we have what we call mucus; what is left behind is the frame of the cement-substance, the so-called goblet-cell, or cup-cell of authors. In the distal portion we can, as a rule, recognize the contracted protoplasm as really holding the nucleus. This shows, in my judgment, that a part of the protoplasm is in a state of active contraction; whereas another part, taking in liquid from without, is in a state of passive expansion. I therefore disagree with Professor Spina in his assumption of an active expansion. I merely say that it is not only an accumulation of protoplasmic liquid, but also an active contraction of one portion of protoplasm, which brings forth the result that we call the formation of mucus, or mucous globules. This we notice when the process is going on with a certain degree of slowness. If, on the contrary, the swelling takes place rapidly, it very often happens that the whole contents of the epithelium will spring forth from the interior, and, being thus set free, represent what we are in the habit of calling mucous and salivary corpuscles. There is scarcely anything more interesting or easier of demonstration than the structure of protoplasm in the salivary corpuscles. It can be done by taking a drop of saliva from the mouth and placing it under a thin cover of glass and bringing it under the microscope. We notice a certain number of protoplasmic bodies exhibiting a delicate reticular structure, whereas others are in a condition of swelling, or, if you would like to call it so, a hydropic condition. That means that the protoplasm has taken into its interior a certain amount of liquid; the reticulum has been torn asunder; the points of intersection, now representing granules, are in a state of active, so-called molecular motion. The third variety of secretion is best represented in the lacteal glands, and this, so far as we can trace, results from the action of the epithelia also. With regard to the anatomical facts, I agree with the essayist; but his conclusions are, I think, theoretical and speculative; for we know that the so-called tartar deposits about the teeth abound in a kind of fungous growth, the leptothrix, which occurs only in acid salts, whereas the saliva is an alkaline liquid, or sometimes neutral. I cannot very well realize that deposition of lime-salts from the saliva will suffice to cause such formations. It seems to me that there must be present some acid ferment in order to permit the formation of such large masses of leptothrix as we see. To be sure, the lime-salts that we find could have no other source than the blood,—especially the liquid that is discharged from the epithelia of the salivary glands.

Dr. Niles. In regard to the professor's criticism as to the precipitation of tartar from the saliva, I have never heard it questioned before that the salts were an accumulation or precipitation from the saliva. If the professor will take the pains to perform the experiment of immersing a lump of calculus in a solution of acid, he will find that it will soon dissolve, leaving only a matrix. So, it would be impossible for it to form in an acid saliva. It could not be formed in an acid solution any more than one can precipitate a carbonate of lime without first rendering the solution alkaline. An interesting experiment is to collect a quantity of saliva and render it strongly alkaline, when the flocculent calculus will precipitate. Add a few drops of acid, and the precipitate will be dissolved again.

Dr. Heitzmann. I would like to ask the doctor how he accounts for the presence of such large numbers of leptothrix, which we know do occur even in acid salts.

Dr. Niles. I know germs are present about calculus of the mouth, and I have regarded them as products of fermentation which has been carried on in pockets about the teeth. There may have been a ferment and an acid reaction, but not a general acid reaction. Beneath or behind the deposits, at special points, acid ferments may act and that peculiar germ abound, but the fluids of the mouth will be found *as a whole* alkaline. I could not account for leptothrix in any other way. I am extremely grateful for the professor's clear and comprehensive lecture upon secretion and the contraction of the cells. I have not had time to look through his work; but I see clearly his idea that this reticular structure in the cell contracts one portion, while from the other portion the contents are expelled, and thus secretion is produced from the whole gland. It is making a deeper study of the subject of secretion than I thought was necessary in this paper; but I am very glad for the addition of his recent investigations.

Dr. William H. Atkinson. My first impulse is to congratulate this body upon having arrived at a sufficient amount of earnestness to be interested in these deep questions; also to thank the reader of the paper and Professor Heitzmann for their remarks, and to beg your patience with me while, as one of old said, I will also show mine opinion. I would have some little criticism as to the anatomy of the parts which have been couched in the paper and the remarks of Professor Heitzmann; but waiving that, allow me to lead your minds a little further, that we may see that we have not arrived at the true explanation of secretion, nor at the ripening process by which all animal chemistry is elaborated. If I were permitted I would take the embryological view of the matter, and speak of all the tissues that constitute the functioning parts of the body. The organs of the body lie between two sets of machinery that I would denominate dia-magnetic batteries; I mean the epiblast and hypoblast,—the skin being the outcome of the epiblast, and the mucous membrane the outcome of the hypoblast; thus justifying the conclusion that I have arrived at in my own ratiocination of the subject, that inasmuch as these two are normally acid and alkaline,—that is to say, the mucous surface is, normally, alkaline, with the exception of the stomach and the cæcum or head of the colon,—with these two exceptions, I believe it is agreed by those who have studied the question that the mucous surface is normally alkaline; and that the skin being always acid, the two at their junctions—the openings of the mouth and anus—make a dia-magnetic battery, by which all the nutrient currents are operated and the power of reflex action takes its origin. I am very well aware of the depth and embarrassments of the subject when we are dealing with modes of motion in the presence of individuals who do not recognize motion, only as it is proved to the crudeness of the senses, excluding our intuitions and unconscious consciousness, by which we perceive the whole of it; and hence I have some embarrassment in speaking about it, lest I should be, as I have been by learned men, called an old fool. I am willing to be called a fool for the truth's sake, but I am not willing to be a conscious fool and ignore the revelations of the modes of functioning bodies presented to my own consciousness in making these observations.

The beaker cell referred to by Professor Heitzmann has been for years the stumbling-block to physiologists, histologists, and embryologists. My own method of interpreting it—I am almost ashamed to say that in the presence of so much learning and of such profound research, when my own has only been superficial, so far as opportunity was concerned—I have denominated the ripening process of each mucous globule, the swelling of the outer end of the epithelial body, or, as Professor Heitzmann says, protoplasmic body. I have taken this to be the result of dia-magnetism, or a coming together of currents born of these two acid and alkaline membranes. So far as the beaker cell is concerned, I take it as being exactly analogous to the corpus-luteum, which is scar-tissue left from the discharge of the ripened ovum; the mucous globule escapes through the cleft of the wall of the epithelium, which collapses and leaves the analogue of scar-tissue, like the corpus-luteum. This granular matter that was spoken of is where it is supposed that the protoplasm granules represent the crossings of contractile fibers in the protoplasmic body, and, by reason of the distention of the water rupturing the finer filaments, some one of these had still its reticulum left, in which the fluid accumulated under the stimulus of these currents that I have spoken of and named dia-magnetic; and that another one of these infinitesimal points served as a nucleus from which a new mucous globule should be grown and ripened and enlarged, pushing out so as to make the bulging appearance that we have seen extruding from the ruptured surface; and thereby we get that viscid mucous by which the food is more easily swallowed. But that theory does not account for the ptyalin; it only accounts for the muscin; it does not account for the ferment that changes starch into glucose. Until we shall have gone further than anyone has yet gone, so far as I have observed, we will only be repeating the observations of our predecessors, without arriving at a satisfactory summation of the conclusions of their observations, so that we shall be masters of the process of secretion and really understand it. The advocates of the theory that matter itself is capable of all functioning processes assume that fact just as much as I assume that it is a power that has not yet been brought within the scope of sensuous perception. In the power we have been dealing with we have what is called ferments, ptyalin and pancreatin (the emulsifier of fat, a product of the pancreas called pancreatin), and that has been dealt with fully on the law of abstract chemistry. They deny organization to chemistry. They say chemistry has to do with the inorganic world and not the living world; and here is a stumbling-block that has been in my way, and I feel sure it is one that has been in the way of every person I have ever heard speak on either side of the question. We cannot deal with the facts without understanding how it is that the granules of the ferment when dry, as they are in a yeast-biscuit, do not lose their power of action without a degree of heat sufficient to disrupt their molecules. Now we are approaching the lymph follicles that have been spoken of, and there is just the line of mergence between secretion and an accumulation without secretion,—a simple percolation. They are auspicious times when we recognize the difference between a true secretion and a mere passage or percolation of a fluid through a membrane between two bodies, and that process where the epithelial body grows; the fluid enters the epithelial body, is elaborated into the character of a secretion within the body, and, upon being sufficiently ripened, is extruded as the secretion of that special order. When we study those questions we will then be able to understand a little more as to how it is that what is called tartar or odontolithus has so many of these micro-organisms within it. I do not like to talk much upon this subject until we shall have heard further from Dr. Niles. He promises another paper, and when we shall have heard that, and then sifted his conclusions from his own observations and readings, we will be better prepared to do something like getting a syllabus in alphabetic form that will help us to a correct interpretation of the subject-matter, and also through the habitually kind assistance of Dr. Carl Heitzmann, who has the ability *sui generis* almost to the last degree to express what he does see, and no man living has helped me to an interpretation of these things so satisfactorily, although he studies nature as a physicist and I as a spiritist. But we do not mind these different ways as long as we get the truth. That is what we are all striving for, and in the end to apply that truth practically in our daily calling, so that it will enter into our moral character and make us worthy representatives of a noble profession,—of a calling, I was going to say, divine; and I am not disposed to take it back, because truth is always divine, illuminative, and redemptive of error wherever it is.

I want Dr. Niles to get his case fully before the court, and then, if I am still on earth, I shall be very happy to have an opportunity to bring my lamps to bear.

Dr. Niles. Dr. Atkinson's remarks rather call for another word from me. It would hardly be possible to get my "case wholly before the court" at this meeting. The only point which I wish to make at this time is in the fact that no change can occur from the blood to the oral cavity which would be in any great degree responsible for this precipitate in the mouth. When we have successfully proved this, we can take a step beyond and see what causes produce it in the blood. I am of the opinion that the primary cause of odontolithus is traceable to the tissues, which are largely made up of lime phosphates, lime carbonates, and magnesium phosphates,—a similar diathesis which produces stone in the bladder, or the accumulations of lime in the joints. This is another part of the subject to which I have given little study, and I am not now able to give you any facts upon it. I may be, however, at some future time.

Dr. Atkinson. Undoubtedly all the elaboration of the pabulum is a process of burning, and wherever you have a fire that has completely consumed the fuel, a metallic salt will be there in the form of an ash,—that is, if it is in an open fire where it is dry; if it is where it is surrounded by water, the ash having been dissolved in it, it will be in the form of lye; and that is the condition in which it is in all the mammalia. The doctor is very right in saying that it is referable to the blood in the grand sense, but we will have to divide the blood considerably more than is the common understanding before we can get a true interpretation and see how these currents move. We will have to say vascular blood, that which circulates in the arteries, capillaries, and veins; neural blood, that which circulates within the vaso-motor, motory, and sensory nerve tracts; and also lymphoid blood. When we get all these churned into a complete heterogeneous homogeneity, we will get a perception of the modus operandi of the precipitation of the resultants of the burning process of functioning bodies, and know the origin of odontolithus.

Adjourned.

E. T. Payne, *Recording Secretary.*

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The First District Dental Society of the State of New York held a regular meeting on Tuesday, March 4, 1884. The president, Dr. A. L. Northrop, in the chair.

Dr. Wm. H. Dwinelle spoke as follows:

Dr. W. H. Dwinelle. It is well known that an effort has been made, on the part of certain persons who are obnoxious to those of us who are disposed to be liberal in our dealings with the world, to bring us under the ban of an assumed patent,—a patent that they have no right to, as we can very easily demonstrate,—and that we are in danger of a repetition of the Goodyear infamy that was so long practiced upon us. I refer to a man by the name of Sheffield, who assumes to have a patent on an old invention, as I and many of you can testify, and he is at our doors claiming "tribute to Cæsar." In order that you may clearly understand the position we are placed in, my friend, Mr. Gordon, has very kindly come here to-night. He has made it his business to investigate this matter professionally, and I have no doubt he will be enabled to enlighten you in the premises.

Mr. Solomon J. Gordon. Until Dr. Dwinelle made his remarks I did not know exactly what would be desired of me to-night, or what would be interesting to you; but I shall assume from what he said that it would be interesting to you to know what I can tell you about the Sheffield pretensions, a phrase that comes to my mind at the present moment, and is a somewhat apt expression. I may say some things here that may not be exactly what all of you might desire to hear, but what I do say I wish you to believe, and I shall endeavor to be a little careful not to say anything that won't "hold water," as the phrase is. I think the briefest way for me to get at it, and probably the most intelligible, will be to give you a little history of my connection with the subject.

I made the acquaintance of Dr. Cassius M. Richmond at a little dinner party at the Windsor Hotel, some time last summer, and he mentioned that he should have some patent business for me, which he knew was in my line of practice, and that I might consider myself retained from that moment. That was all very nice, but the money did not come, and has never come yet. I was interested in the doctor as a genial, pleasant, good fellow. I was pleased with his appearance, and friends of mine who were interested in him spoke a good word for him. I have, personally, not one word to say against him, nor, for that matter, against anybody else, to-night. I have nothing, personally, to say against Dr. Luke T. Sheffield, but facts are facts. Some time during the summer Dr. Richmond came to my office and wanted some proceedings instituted against Dr. Luke Sheffield, to have a patent, which I believe was Dr. Cassius M. Richmond's brother Alvan's, declared void. He wanted proceedings instituted to attack Dr. Luke Sheffield on the ground of fraud, and to get the patent out of the way. I heard his story. He said he had not very much money to spare, and I told him it would be a profitless venture, and that as Dr. Sheffield was not troubling him, and he was not paying any money, he had better go home and get behind his chair, and earn all the money he could, and not launch himself into a law-suit until he was obliged to. It was good advice, I think. At any rate he went home, and I saw nothing more of him in the way of business, until a month or two since, when he appeared and handed me a lot of papers, and said an application had been made for a preliminary injunction against himself and his brother. I looked over the papers, and found the application was based upon five patents, I think, but mainly upon three patents, which we will call the Richmond tooth-crown patents, for the original Richmond tooth-crown, with which you are all familiar, and which is a band, etc., for attaching an artificial crown to a natural root, and holding it there. The other two Cassius M. Richmond patents were for a process of doing that, and a process for cutting a tooth off and sticking a stick into it in some way. Those were the three great Richmond tooth-crown patents. Then I began to study dentistry a little with the doctor, and he told me those things were all old, and had been used for many years, with the exception of the main tooth-crown patent; and gradually, to my astonishment, he told me that he had first used them in San Francisco three or four years before he applied for the patents, and that he had traveled all the way from there to the Atlantic coast with them, exhibiting them everywhere and to everybody. One of the other two patents was the Low patent, which was for something like a bridge running between two natural teeth, to which it was fastened by means of bands or something of that kind. He said it was of small account. The other one was Alvan S. Richmond's bridge patent, which consists of a method of putting the Richmond tooth-crown upon an old-fashioned bridge. We looked through the patents, and I got a pretty good idea of them, and then I picked up the rest of the papers and began to read them over, and the first thing I struck was a terrible document in the shape of a license issuing from the International Tooth-Crown Company, of which Luke T. Sheffield was the principal officer, secretary and treasurer, I think; possibly, president. I read that document with great astonishment, and I began to feel bad. To say it was a hide-bound document don't begin to express it. I don't think I would be willing to look you all in the face if I had ever been guilty, and thought you knew it, of getting up such a document, and attempting to pass it off upon my fellow-men. The great iniquity of it, as it seems to me, was this, that while it only ran for one year, expiring in February or early in March, they (there were two, Alvan having one and Cassius the other) not only covenanted, undertook, and promised that, during the existence of that license, they would never speak one word against the patent, nor do anything to show they were invalid, but further, while it was entirely optional with the grantors, otherwise the International Tooth-Crown Company, to renew the license for the remaining fourteen or fifteen years or not, yet the licensees covenanted that they would never say or do anything against those patents during all those remaining years, and would not use them in case the license should not be renewed. They were to have a license for one year, and then it would be optional with the International Tooth-Crown Company to continue it or not at their pleasure; and if they did not continue it, then the mouths of the licensees were shut, and they so covenanted that they would not practice or use in any way the things described in those patents, and would do nothing to show there was fraud, or that the patents were invalid. The learned counsel of the Sheffields take that position now, and say they can carry it successfully through the courts. I don't know but they can. I don't know what the courts will do. They may sustain those patents and those licenses, but if they do we shall be wiser then than we are now.

That was the position of affairs. Moreover, there was another provision in this document, which went still further. It provided that, upon the licensee's failure to comply with the terms of the license, either during its continuance or during the succeeding years of the existence of the patent after the license had come to an end by lapse of time, and the grantors did not see fit to renew it, the grantors could go into court and demand an injunction to prevent them from using any of the things described in those patents, and that the court should grant it forthwith. In other words, it was a sort of confession of judgment on the part of the licensees. I said to the doctor, "You are in a very bad boat. Why didn't you come here before and have this thing looked into? The proper thing for you to have done was to have continued to pay your license fee until the license had expired by its own limitation. It has only a few months to run, and you might better have paid a few hundred dollars and kept still, and then you would have been in a better position." I furthermore suggested that the best thing for him to do then was to back water a little; go and pay up and keep peace until the license should run out. He said no, he should not pay a cent, and he adhered to that determination. I want to say everything good about everybody that I can, and I must say that the ground upon which he put this determination was high ground, and for which he should be commended. It is not for me to say whether he meant it or did not mean it. At any rate, he said, and repeated it many times, that he thought he had been foolish and had made a mistake; that he did not know what he was about; that he was too easy and careless, and had been sort of run away with by Sheffield;

but now he was disgusted with himself, and ashamed to show his face before his professional brethren; that he cared more for the feeling that his professional brethren had for him than for anything else, and he would stand the consequences, whatever they might be. I said to him, "If you are going to take that ground, and your mind is fully made up that you will take its chances, we might as well do it just as we mean to have it stand in years to come. These patents are to run fifteen or sixteen years. 'Time is short and art is long.' We had better put this thing just as it is." I went into court with him on that state of facts, and he made his affidavit, after due deliberation, and under my advice to make it, if he meant to take that position and stand on it. He went in and swore that when he applied for the three Cassius M. Richmond patents—to wit: the tooth-crown patent and the other two I have spoken of—all the inventions, and every particular and detail of each and every one of those inventions, had been by him in public use in the United States for more than two, and, I think, nearly four, years. Now, by the patent act a patent granted under that state of facts is absolutely void. Yet he, when he obtained those patents, took oath—without which they could not have been granted—that they had not, to his knowledge, been in public use in the United States during the previous two years. I remember distinctly when I showed him that paper, of watching him, partly out of curiosity to see how a man will look when you hand him a paper that is enough to knock him down. I said, "Did you read that paper over when you applied for these patents?" He replied that he did not; that he was busy when they were presented to him, and did not read them at all. I said, "You would better have read them. It would be no excuse, if you are indicted for perjury, to say that you did not read them." His chin dropped a little, as he looked at the paper, and he said, "Did I swear to any such thing as that?" I said, "Certainly you did. You could not have obtained your patents if you had not." That staggered him a little. He said he had simply been careless in the matter, and not wicked about it. I went to the court and made the best presentation of the case I could under the circumstances. I said the man acknowledged that he had been foolish; that he was ashamed of what he had done, and came now like an honest man and confessed the weakness of which he had been guilty,—confessed to perjury, and that the reason why he came and did this was that he did not mean that his professional brethren in the United States should be wronged any longer under those patents. The next startling thing was the information on his part that when that wrong was done Dr. Luke T. Sheffield knew all about it, just as much as Cassius M. Richmond knew about it,—that is, that those inventions, every one of them, and every detail of every one of them, had been in public use in the United States for more than two years. Whether that is true or not I do not know. I state it as he told it to me. But, further than that, there has some evidence come into my hands which seems to be absolutely conclusive on that point; for I had, and think I have now, a paper published in this city, signed by Dr. Sheffield himself, in which he had omitted the dates, but had published everything else, containing certain letters from eminent men in your profession, in which they had said, more than two years before the application for those patents, that they knew all about the thing, and had seen it in practice.

Dr. ——. What was the date of the application for the patents?

Dr. A. S. Richmond. They were issued on January 8, 1883.

Mr. Gordon. It is certain that the things were in public use more than two years, probably three or four years, before the patents were applied for. I think the thing was first done in 1878; I am not certain but that it was as early as 1876, and that it was then exhibited throughout the United States to the members of the dental profession.

Now, just at this juncture, there comes a very opportune decision, —what we call in law a case of "new impression." We frequently have cases brought to us in which patents are standing in just the position of these patents,—they are void, and are known to be void by those who know the exact facts; but there they stand under the seal of the United States Patent Office, and they are good until they have been shown to be bad. They are used as a handle to extort money from innocent parties, and parties who cannot go to the expense of indulging in the luxury of a patent law-suit, parties who would rather pay than fight, and so a good deal of money is obtained under such worthless patents. Until within a few months there has been no way to get rid of them that we knew to be a sure way. But some lawyer has had the courage and the wisdom to bring, in one of these cases, a bill in equity in the United States Circuit Court, which has sole jurisdiction, under an act which was originally passed with reference to grants by the United States of land to settlers, in which act jurisdiction was given to the United States Circuit Courts to entertain a bill in equity, filed by the District Attorney, or by the Attorney-General of the United States, on behalf of the United States, to have a grant of land declared void in case fraud had been perpetrated upon the United States in obtaining it. My professional brother said the language of that statute was such that it would apply to patents in general; that there was nothing in it that particularly limited it to land grants. So he tried it on and it worked, and not more than two months since Judge Wallace, of this circuit, decided that such a suit, instituted by the United States, to declare a patent void for the reason that there was fraud in its initiation, and the Government was deceived by fraud and perjury, must be entertained. The case in which he made this decision is quite a parallel case to the ones we have in hand. It was the intentional taking of a false oath, to deceive the officers of the Government, that the thing had not been in public use two years before the application was made, when in fact the applicant had himself had it in use for more than two years before that time. That case has been decided in favor of the Government, and the decision has opened a remedy in just such cases as this.

Now, as regards these patents, in my judgment no dentist who has not taken a license from the International Tooth-Crown Company is in the least danger of being sued, or having any attempt made to enjoin him. They never will try it on. To my knowledge, and I am pretty well informed on the subject, they never yet have attempted it. Take the Richmond case, which was the best case that could possibly happen for them, and just that took place which I expected would take place. I went into court with evidence to show that these patents were fraudulent; that they were initiated in fraud, and were steeped in fraud all the way through to the license. The court said, "That may be so, but the Drs. Richmond cannot be heard to say that; they cannot come into this court and set up their own fraud and their own perjury in answer to any kind of a suit that is brought against them." Well, that is equity; at any rate it is a rule of equity older than the days of Queen Elizabeth that a man shall not be heard in a court of equity setting up his own fraud in answer to a suit brought against him. My answer to that was that Dr. Sheffield was in the same boat; that he was *particeps criminis*, and therefore that that rule ought not to apply as in other cases. But the court refused to hear that defense, and said the Richmonds must either pay their dues under the license, or else he would enjoin them. We did not pay, and the injunction issued. As regards Cassius M. Richmond, he was in the position of having confessed to perjury, and so there would be no probability whatever of preventing the injunction in his case. As regards Dr. A. S. Richmond, the case was a little different, in that he had no participation whatever in obtaining these three Cassius M. Richmond patents. Therefore, not being amenable to that charge, he stood better. But, nevertheless, as the Richmonds were sued jointly, there were very grave doubts whether the courts would allow them to split the defense, and I did not think it judicious to try that point then, believing it wiser to defer it until a later stage of the proceedings, when we could file our answer and take the position in court that the cases are separable, and that a case that lies against C. M. Richmond does not lie against A. S. Richmond. Whether the court will entertain that or not remains to be seen.

Now we come to the second class of what we may call the unfortunates, those who have taken licenses of this character for one or more years, with the provisions I have spoken of whereby they are tied hand and foot, body and soul. As regards those gentlemen, we must see the result of a suit in such a case before we can positively say whether the courts will hold them to such a contract as that which they have signed. The argument upon one side will be: You have signed this agreement, and the consideration was that you should have the privilege of exercising the inventions which are secured by these patents. You have made these promises and you must keep them. The argument on the other side is this: That it is against public policy and against good conscience, and that a court of equity ought not to sustain such a contract against any man after it is shown to the court that the whole thing was conceived in fraud, and that if the patents upon which it is based are absolutely void, every contract and agreement based thereon is void, the consideration utterly failing.

In regard to those who have not taken licenses, they are not tied in that way, and I do not believe any of them will ever be sued under these patents. I have heard it upon good authority that they say and admit that the patents are gone; that they cannot sustain them; but by being careful whom they sue, and not allowing any chance to arise in court whereby the thing can be shown up,—that is, by confining their suits to Dr. Richmond and to other licensees, —they would prevent the real merits of the patents from ever being adjudicated; and if they do that, I do not see why they may not run them for fourteen or fifteen years, if they find gentlemen willing to take their licenses and pay for them. As I understand the thing, I believe that the Richmond tooth-crown patent would be held void by reason of the fact that the invention was made and published by Dr. Dwinelle twenty-nine years ago. On that ground alone I think the patent would not be sustained upon a careful judicial investigation; but upon the ground that the thing was more than two years in public use at the time the patent was applied for, it is absolutely and completely void. As regards the Low patent, I do not know that it is of any importance. As regards the other A. S. Richmond bridge patent, which is for putting a Richmond tooth-crown on an old-fashioned bridge, my opinion is that, inasmuch as for twenty-five or fifty years it has been customary among dentists in this country and in Europe to place artificial teeth on a bridge, spanning a space between two roots or teeth, I cannot see where there would be any invention in putting a Richmond crown on such a bridge. Further and beyond that, we shall show conclusively, if we ever get the chance, that it is open and free to all men to use the Richmond tooth-crown proper; that there is nothing patentable in that; and that the bridge is, not as old as the hills, but almost as old as dentistry. I think in 1804 such bridges were recorded; so that if there is nothing new in the bridge and nothing new in the Richmond tooth-crown, I don't see how they can be held on a patent for putting these two things together that have been in use separately for so long a time.

Dr. Dwinelle. Your investigations have proved that we are in a very promising position; and, assuming that we are ready to take advantage of it, what is our remedy, and what is your advice in the premises?

Mr. Gordon. My advice would be to bring a suit by the United States District Attorney or by the Attorney-General at Washington, to have those three patents declared void; and, as I understand such a suit can be brought in any part of the United States, here would be the best place to do it, because Judge Wallace, having decided that point, will be certain to sustain it. That is all that I should recommend. Dr. Dwinelle alluded in his remarks to another course of proceeding, and his statement of the position in which Dr. Sheffield stands is, so far as I can see, correct. On that matter I have taken occasion to consult one of the most eminent criminal lawyers in the city,—one who is entirely familiar with such things,—to ascertain if I was correct in my remembrance of the criminal law, which I have not practiced for twenty years, and he said I was correct, and that it was unquestionable that Dr. Luke T. Sheffield was equally culpable and equally amenable to the law with Dr. Cassius M. Richmond in obtaining those patents. Furthermore, I am told that a similar state of facts, or some facts which would bring them under the legal denomination of fraud upon the Government, is also true of some six or seven other patents held by the same parties, but which I have never had occasion to look into. It is bad enough to study up five patents for four or five weeks and have no money to pocket, by the way. There is nothing else that you can do, except to bring such a suit, for the reason that it is entirely optional with them to sue anybody or nobody. If you bring no suit and they bring none, you will be practically remediless. You can challenge them to sue you, and they simply will not do it.

A vote of thanks to Mr. Gordon for his statement of the case in its legal aspect was passed.

Dr. W. D. Tenison. I had the honor to be chairman of the clinic committee in 1878 or 1879, when Dr. Cassius M. Richmond came to

New York from San Francisco and presented himself at one of our clinics and showed us his tooth-crown, several of which were set in his own mouth,—placed there, as he told us, by one of his assistants. I asked him to give us a clinic on it, which he promised to do. On my invitation he came to the meeting of the society that evening and explained his method. On that occasion he offered to go into the offices of dentists and exhibit and illustrate his method for a fee of twenty-five dollars for each crown set by him. I invited him to my office; he came and set three of his so-called crowns there, and gave me to understand that the profession were to have the free use of the method. I never could get him to give a clinic before the society as he had promised. A gentleman now in this room did give us a clinic a month or two after that, and he used at the clinic the very same crowning method, setting the tooth identically the same as Dr. Richmond had set his in my office; and he presented at the clinic three patients with the same kind of crowns in their mouths, which they had worn for several years. I refer to Dr. R. P. Perry. His method of ringing the root of the tooth was precisely the same as Dr. Richmond's. One of his patients told me she had worn the teeth in her mouth for four or five years at that time, which was just after Dr. Richmond came to New York City; so that we have the amplest evidence of the fact that that method was in use for several years before Dr. Richmond presented himself in New York.

Dr. Dwinelle. We are here in quest of information, and we occupy a very delicate position. We know that Judge Wallace has rendered a decision in an analogous case that is of the greatest importance; coming at this time it is invaluable to us. We do not want to repeat the experience we have gone through in the past. Our own inventions are patented and we have not the right to use them, and the patentees appear at our doors with a demand for blackmail. No decision could be more opportune than the recent decision of Judge Wallace. We have a golden opportunity, and we ought to embrace it.

Dr. W. H. Atkinson read the following paper on

"PEROXIDE OF HYDROGEN AND IODOFORM."

I have a case of dead pulp in the left superior lateral incisor, in which I have used peroxide of hydrogen and iodoform with marked success.

The history of this case is very instructive. The patient told me that he fell upon the ice some six years since, fracturing the left superior central incisor, losing the lower third of the crown. The pulp died. His dentist filled into the root with gutta-percha, and completed the contour of the tooth with gold. A persistent abscess afterwards formed, involving the gum over the transverse plate of the left superior maxilla, extending to its junction with the palatal bone of that side, which the patient says was pronounced to be necrotic by his dentist.

In the treatment of the case extensive scarifications had been resorted to at intervals for two or three years, when it was supposed to be healed. But the patient was again obliged to put himself under treatment, which covered an additional period of some eighteen months. The treatment now consisted of opening through the lingual surface into the pulp-cavity, thus reaching the chamber of the abscess. The remedies used are not stated. The pulp-canal, however, was filled, the abscess still remaining. External treatment and scarifications were continued for a year and a half more, without satisfactory results. The patient tells me that the scarifications were repeated as often as twice a week. After five years' faithfully following advice and treatment without satisfactory results, he became discouraged and sought other advice. In going from one to another he finally was directed by a friend of mine to come to me, which he did on the 28th day of January just past.

Upon examination I found the tissues immediately about the central incisor sound, and the filling in the lingual surface in good condition, the roof of the mouth bagging down, with numerous ulcerous patches on the depending portion of the mucous membrane. Upon closer inspection the pulp was found to be dead in the left superior lateral incisor. The color of the tooth was so little changed as to require close inspection to determine that the pulp was dead. We at once opened into the pulp-chamber on the lingual surface, being very careful not to allow the drill to penetrate the depth of the chamber. Upon withdrawal of the drill, I was so confident that a disintegrated pulp, in the form of bland pus, occupied the chamber, —thus accounting for the normal appearance of the tooth—that I called the attention of my sons and Dr. Baylis, who assisted me, to it. We waited a moment, and were gratified to see a globular mass of pus slowly peep out of the opening. With a piece of cotton I wiped off the drop of heavy, thick pus, which was immediately followed by thinner and thinner pus, and then clear pabulum, when arterial blood followed, indicating the effort of nature to reproduce the broken-down tissues. After clearing this out, and following the direction of the line of the tooth, a drill was carried through the foramen into the pocket, which was found full of embryonal structure, and blood flowed bountifully from the chamber filled with this embryonal mass. As soon as the bleeding subsided, to prove that there was no pus remaining in the chamber, I injected it at once with peroxide of hydrogen, and, when no foaming occurred, I was satisfied there was no free pus in the chamber. I dismissed the patient without further dressing, leaving the drill-hole open, and instructing him to place a little cotton in the opening, just before eating, to keep food out. This treatment was repeated, with the addition of Listerine, for three days. On the fourth day, upon the introduction of the peroxide, a slight foaming was present, indicating a breaking down of some portion of the embryonal tissue into pus. I then dressed it with a dry cotton tent. This treatment was continued two days. Upon the removal of the tent at the next sitting, the end was stained with fresh blood. I then dressed it with chloride of zinc. The ulcerous patches in the roof of the mouth not healing satisfactorily, were dressed with salicylic acid in alcohol for a few days. They still did not heal kindly, so I opened into the abscess chamber through the roof of the mouth, through which to inject the peroxide of hydrogen, which freely flowed through the tooth, thoroughly washing out the chamber and the tooth. Lest the opening in the roof should heal before I was ready for it, I introduced a tent of cotton and creasote. This treatment, with slight variation, was continued up to February 15, when I determined to try the effect of iodoform and ether on the ulcerous patches. On the 17th the patient complained of the odor, and I resorted to "iodoform-aromaticat," which means inodorous iodoform, and which is obtained by the admixture of coumarin (an extract of Tonka bean) and plain iodoform. This very much modifies the odor, and most patients like it. The manner of applying the inodorous iodoform resorted to was to twist a bit of cotton on a dressing-needle tight enough to hold, and dip this in oil of wintergreen (gaultheria), which induces the iodoform to adhere to the swab, so as to be conveniently carried to place. To prevent its coming in contact with the tongue, I used common white paper upon the tongue while painting these patches with iodoform, after which the patient was directed to carry the paper to the roof of the mouth with the tongue, and while holding it there to close the teeth upon its projecting edges, which were then torn away, and the patient dismissed with instructions to wear it there an hour.

What may be learned from the history of this case? I answer, many things. First, not to value our attainments so highly as to induce us to eschew society meetings, and association and consultation with others in our calling, as the dentist did who had charge of this case; second, to have a distinct purpose to accomplish in every undertaking, even to the minutiæ of diagnosis, prognosis, and treatment, each step of which should be clear, regular, and efficient; third, to trust to nature more and overtreat less. This sort of experience grows out of practicing in the commercial rather than the professional sense. There is a prevalent tendency among dentists of limited opportunities and education to regard it as belittling to ask counsel or to send cases to others for advice or treatment. When you are not clear and decided what to do, either wait for developments or call counsel, or dismiss the case for safety to patient and practitioner.

Dr. C. F. W. Bödecker. I had a case very similar to the one described by Dr. Atkinson. The patient is a gentleman about twenty-five years of age, and the tooth, a left upper central, had been filled largely in the mesial surface about seven years ago. Two years later an abscess developed, which has been treated by several gentlemen more than five years. About a month ago, when the patient came to me, he stated that he was in the habit of evacuating the contents of the abscess once or twice a day, on account of the abundance of matter present. I took a little vessel and held it over the abscess, and extracted from the cavity more than half an ounce of pus. I then made a large opening in the abscess with a lancet, washed it out first with salt water, then with peroxide of hydrogen, inserted a pledget of cotton, and sent the patient away. The next day I examined the tooth and found it was open from the lingual surface, and the patient told me it had been so for more than five years. I syringed it out with peroxide of hydrogen again and filled the pulp-canal. I saw the patient yesterday morning, and, although the cavity is not quite healed up, it will take care of itself.

Dr. S. C. G. Watkins. I am in the habit of using iodoform, and feel that it is one of the best remedies that we have, and I should not know what to do without it. I would like to describe a case similar to the ones that Drs. Atkinson and Bödecker have described. A lady, about twenty-five years of age, had a right superior central incisor which was considerably discolored. I diagnosed a dead pulp. Upon opening into the canal the pus flowed out quite freely. In a few moments I directed the patient to get up a suction, which she did, and drew the pus out, which was followed by a little bleeding. Warm water was then injected into the canal to thoroughly cleanse it. I then injected iodoform in the form of an ethereal solution up through the canal, placed a bit of cotton loosely in the cavity, and dismissed the patient. At the end of three days she called again for further treatment. I removed the cotton, and the pus flowed out just as it did the first time, followed by slight bleeding. As soon as this had ceased I injected iodoform clear through the canal to the apex of the root,—a goodly quantity of it,—and then carried a very small bit of gutta-percha to close the apical foramen, and filled about one-quarter of the root-canal; then filled the cavity and the canal with alum, and injected Labarraque's solution through the alum, which immediately threw off the chlorine gas, and in about twenty minutes the tooth was bleached nicely. I then proceeded to fill the root with gutta-percha and the cavity with gold, and completed the whole operation at that (the second) sitting. For two days there was slight inflammation, which completely disappeared, and it is now two weeks since the operation, and everything seems to be all right. In cases where iodoform is used less treatment is required, as will be seen by this case. Putrefaction does not take place where iodoform is used.

Dr. W. S. Elliott. The subject of iodoform is one of considerable interest, and I think that, in order to better understand its therapeutic properties, it would be well to enter into the chemistry of the compound, without which we cannot understand the relationship it holds to the tissues; and in order to understand the molecular construction of iodoform it may be well to make a comparison of it with such other substances as are allied to it in chemical constituents and chemical powers. Among the elements in the chemical world there are certain groups or classes, and among these classes is one called halogens,—four in number, viz., chlorine, iodine, bromine, and fluorine. In the making up of compounds nature has established certain typical forms, from which all substances are constructed. For instance, we have what is termed the hydrochloric acid type, the water type, the ammonia type, and the marsh-gas type; and many substances are built upon one or more of these types. I can, perhaps, better illustrate upon the blackboard what I mean by these types. We will express hydrochloric acid as HCl. That becomes one of the types upon which certain substances are built. If I should strike out this atom of chlorine and put an atom of bromine in its place, we then have hydrobromic acid, and, therefore, built on the same type as hydrochloric acid. Again, substitute an atom of iodine, which has also one bond of affinity, and then we have hydroiodic acid. All these substances are more or less soluble in water, and hence we get chlorine water, bromine water, iodine water, and fluorine water. Just so we have one water type, H_2O. In that we have an atom of oxygen having two bonds of affinity. On this type is built another series of compounds known as the water type compounds. Substitute for one of these atoms of hydrogen an atom of potash, K, and we have then hydrate of potash. Then you may substitute Na, which is soda, and then we have hydrate of soda. Let us go still further and put in NO_2, the radicals of nitric acid, and we have this substance, built upon the same basis as its antithesis, caustic potash.

When we come to the subject under consideration we find that iodoform is built, not upon either of these types, but upon what is known as the marsh-gas type,—the marsh-gas type having for its basis carbon. This element has four bonds of affinity, and requires four atoms of hydrogen, each having its one bond of affinity, to saturate the molecule. Here, then, we can build as before other molecules or other substances upon the same principle of substitution. Suppose I should substitute for three of these atoms of hydrogen, chlorine, which has one bond of affinity, the same as the atoms of hydrogen. We have now carbon, one atom; chlorine, three atoms; hydrogen, one atom. This molecule is built upon the marsh-gas type, and, having substituted for each of the three atoms of hydrogen an atom of chlorine, we have a molecule of chloroform, which is built upon the basis of the marsh-gas series. But suppose that, instead of using chlorine, we should put in three atoms of bromine, which comes in under the halogens, and we have then bromoform. Again, substitute for these atoms of bromine, iodine, which is another one of the halogens, and we have iodoform. Now you see that this iodoform is built upon precisely the same basis that chloroform and bromoform are, and all are built upon the basis of the marsh-gas type. This is done to show the relationship of iodoform to these other substances, how they are classed, and how we handle them; not to show their therapeutic values, but their chemical properties and powers. Fluorine is one of the elements of the halogen group, yet it has properties peculiarly its own. We only know it from its compounds, which would come in under these forms. These compounds are called iodoform, chloroform, and bromoform, for the reason that they are of the same structure as a substance obtained from the red ant (*Formica rufa*), and called formic acid.

The society then adjourned.

James E. Dexter, *Secretary.*

SOUTHERN DENTAL ASSOCIATION—SIXTEENTH ANNUAL SESSION.

(Concluded from page 434.)

Second Day—*Morning Session.*

The subject of "Irregularities" was again taken up.

Dr. Taft would simply emphasize what Dr. Patrick had said with reference to the time when interference should be made. It should not be attempted too early; many cases are undertaken too soon. No attempt should be made until the permanent teeth are completely developed—namely, until the indentations or cusps on the points of the incisors are worn away. Undoubtedly calcification will be completed by that time. Ordinarily he thought it would not be safe to interfere in the way of changing the position of the teeth until the fourteenth or fifteenth year; but on the other hand, regulation may be hopefully undertaken in favorable cases up to fifty years of age. All who have attempted regulation know that in many cases the teeth are moved easily without marked irritation; and that in other cases marked irritation is easily set up, suggesting that caution is at all times necessary. As the result of the shifting of the teeth the process is absorbed before and a new formation is set up behind the tooth which is moved to hold it in place. It is a question whether this new formation is more or less susceptible to disease than the original process; the speaker has sometimes thought it was more susceptible, but the question still remains undecided. The Coffin method of regulating should be more generally known and practiced. The speaker thought it the best that had been brought to his notice, especially where the arch is to be enlarged. The plate is so constructed that the pressure comes against all parts of the arch, and the teeth retain more nearly their original position and are less subject to changes. Dr. Patrick's appliance is very efficient and in many cases is as good or better than any other, but the Coffin plate seems to have a wider range of applicability. These two seem to embrace about all that is required in any conceivable case of regulating, and if they were thoroughly understood it seemed to him there would be very little occasion for any of the intricate appliances sometimes used. If the teeth are let alone they will in many cases come into their places without aid. In many other cases, intelligent patients, or their mothers, may accomplish much by persistent manipulation. Boys and girls will often take an interest in the regulation of their teeth, and the dentist would do well to direct them, if they are intelligent, and will give the time and attention necessary, how to proceed. The results reached by this course are much better in many cases than any quick work would be. An unsatisfactory feature of regulating cases is that not one case in a dozen is properly remunerated. The time devoted by the dentist to the regulation of a set of teeth would yield a much larger income if employed in almost any other direction. The money to be received should not of course be the sole object, but it should be taken into consideration.

President McKellops. Dr. Patrick has a letter from a prominent officer of the Ordnance Department at Washington in relation to the swelling of amalgams in fillings, which would be of interest to us.

Dr. Patrick spoke of his paper on "Oral Electricity and the New Departure," read before the American Dental Association at Boston, in which he took the ground that amalgams were poor things with which to fill teeth. At the time that paper was written he had been investigating the subject, but could never get any satisfactory knowledge as to the behavior of amalgam under certain conditions. The paper to which he referred attracted no attention; it was ignored by nearly all the journals and fell flat. It was worthy of better treatment. Either it was full of truth or it was full of error. If the former, its teachings should be familiar to every dentist; if the latter, its falsity should be exposed. Every man knows that the time will never come when there will be no demand for amalgams; that there never will be a time when any material will reduce the dental profession to one dead level. Dr. Patrick then quoted from Haswell the definitions of alloy and amalgam.

> "Alloy is the proportion of a baser metal mixed with a finer or purer, as when copper is mixed with gold."
>
> "Amalgam is a compound of mercury and a metal—a soft alloy."

Haswell further says that "all compositions of copper contract in the admixture and all amalgams expand," and yet you will find manufacturers who claim that their amalgams will not expand. Being unable to find anything bearing on the subject in other writers, he had written to Lieut. Niles, of the Ordnance Department, who in his reply stated that he had referred the matter to Dr. Woodbridge, who replied that, so far as his experience went, amalgams expanded in cooling. "Dr. Woodbridge," wrote Lieut. Niles, "has had considerable experience in the preparation of amalgams, and is the best posted on the subject of any of my acquaintances whom I could consult. I think you will find Haswell is right." Dr. Patrick, in conclusion, said that Haswell was received as authority by all the engineers in the army and navy, and by those in civil life as well. If it is good enough authority for them, why should it not be for dentists?

Dr. McKellops. There is a formula for solder in Haswell which if only understood among dentists would be a great boon to them.

Dr. Patrick. The purer the metals used in a solder the better the solder will be. Jewelers never use base metals in their solders. If it is only a 14-karat solder, they never use tin or anything else of that nature, because it makes a rotten solder. A properly prepared solder will flow as readily as water; but you cannot make a solder that will relieve you of the necessity of using the blowpipe. The formula to which Dr. McKellops refers is, gold (the kind you are to use the solder upon whether 18 karat or 22 karat) 89 parts; silver 7 parts; copper 4 parts. After using all you wish to, if any is left, don't put it away for another time, but melt with your plate and roll out. Always make your plate first and your solder afterwards from the plate. Never carry solder over. There is nothing saved by having a poor solder, but when solder is made as here directed you can scarcely tell it from the gold itself; when polished it cannot be distinguished.

Dr. McKellops. One advantage in solders made according to the formula just given, which was overlooked by Dr. Patrick, is that they stand just as well in the mouth as the gold itself from which they are made.

Dr. F. H. Rehwinkel, Chillicothe, Ohio, called attention to the traffic in American diplomas reported from Europe. It was thought that after Buchanan's institutions were rooted out this was ended; but he had recently received letters from Dr. Adolf Petermann, of Frankfort, Germany, complaining bitterly about the Wisconsin Dental College and its fraudulent diplomas, and that no steps were taken by the members of the profession here to stop its nefarious work. The Buchanan matter was left to the enterprise of a member of the Philadelphia press to ferret out and bring its perpetrators to the bar of justice. Dr. Petermann had fought zealously for seven years for the good name of the American dental colleges, and he now again takes up the gauntlet for them, but he asks the profession on this side to aid him by formal condemnation of the value of these diplomas. The speaker thought that pressure should be brought to bear on the Legislature of Wisconsin to induce it to annul the charter of the Delavan institution. You will probably all remember the circulars sent out from this institution, some two or three years ago, in which the offer was made to send the diploma of Doctor of Dental Surgery on "genuine parchment" for the munificent sum of $12. The speaker was insulted at the receipt of the circular, and sent his comments on it to the editor of the *Ohio State Journal of Dental Science*, but the editor stood on his dignity and thought the publication of the communication would be giving undue notoriety to the establishment. The profession have always stood too much on their dignity in these matters. It is time to call a halt on such procedures. Pressure should be brought to bear on the State Department and the Legislature of Wisconsin to cause an abatement of the evil. The German government has taken steps to prevent the legalization of the diplomas of this institution in Germany. The hands of all who are engaged in combating this fraud should be strengthened by every means in our power.

Dr. W. H. Morgan, Nashville, Tenn., condemned most earnestly the manner in which the Delavan institution was bringing the good name of the dental colleges into disrepute, but he did not know how to reach the evil except by the creation of a public sentiment against it. It is a matter of deep interest to us, so far as our standing or repute with the profession abroad and with the medical fraternity is concerned. The whole influence of the institution named has been to degrade the profession, but discussion of the subject merely consumes time, unless we can have something like a resolution condemnatory of it adopted.

On motion of Dr. A. O. Rawls, a committee, consisting of Drs. Rawls, Morgan, and Catching was appointed to draft resolutions expressive of the sense of the association with regard to the matter.

Dr. W. Storer How exhibited the How artificial crown and appliances for mounting it, and explained the method pursued * by means of diagrams on the blackboard.

Dr. H. A. Smith, Cincinnati. Sometimes there is difficulty in this operation in filling behind the post. For this reason it is well to fill this portion of the crown before slipping on to the post. He had had more satisfaction in the use of the How crown than with any other he had tried; but in order to have perfect success, you must have all the tools. You can't get along smoothly with only two or three.

Dr. McKellops. The instruments in the How set are also very valuable for other purposes besides those for which they were primarily intended; for instance, they are excellent for taking out a root. Dr. Rehwinkel has translated from the German a description of the new method of filling teeth known as the German method.† What has been his experience with it?

Dr. Rehwinkel had only experimented with it sufficiently to form an opinion of its value where amalgam is the filling-material. With the burnishers you can burnish amalgam into a cavity by the rotary motion very perfectly. So far as his experience goes with the use of gold after this method, it requires a good deal of practice to become expert and to acquire confidence in your own ability, and until that time it is a matter of uncertainty and doubt. In Germany it has acquired considerable popularity. Dr. Von Langsdorf, a pupil of Dr. Atkinson's, has adopted it almost exclusively in his practice. Dr. Nicolai has adopted it to the exclusion of everything else. In practicing this method a matrix is indispensable, as you must have a butt-shaped cavity; otherwise it cannot be practiced successfully.

Dr. McKellops had had a set of instruments made by The S. S. White Dental Manufacturing Co., after the direction of Dr. Herbst, and had tried the method in a number of experimental fillings out of the mouth and in some practical cases in the mouth. He was satisfied that there was enough value in it to warrant further experiment.

Adjourned.

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*This operation has already been described at length in the DENTAL COSMOS. See issues for April, May, and July, 1883.

†For description of this method of introducing fillings, see DENTAL COSMOS for April, 1884, page 210.

Afternoon Session.

Dr. Rawls, from the Executive Committee, reported that he had received a letter, which was read for the information of the members, from R. I. Pearson, secretary of the Dentists' Scientific and Benevolent Association, calling attention to the objects of the association, and transmitting copies of the constitution and by-laws.

The Committee on Dental Pathology and Therapeutics was called.

Dr. Rawls hoped that those present would wake up to the interests of conservative dentistry. Gentlemen have usually a great deal to say regarding manipulation, but it would seem from the silence with which the announcement of the principles which underlie treatment as subjects for discussion is greeted, that there are many things in them which are never looked into. How many of us understand and appreciate and are willing to abide by what we do when we place a filling-material in contact with living tissue, knowing that there is an incompatibility between the tissues? He would again ask attention to the same bugbear of which he had spoken last year—pyorrhea alveolaris. We have been told by the authors of papers in the journals that the treatment and means of cure of this disease are perfectly understood. Dr. Black said a year or two ago that the etiology of the disease had not been given, so he presented his own ideas of it. About the first expression on this subject came from the Connecticut Valley Dental Association. This was followed by a report to the American Dental Association at Chicago in 1878. At this time two views as to the disease were held; one that it was a local disease, the other that it was a constitutional trouble with local expression. At Chicago, on the occasion referred to, Dr. Rehwinkel read a paper advocating the view that the disease was constitutional, and the speaker supported his idea that the peculiar arrangement of the molecules which will in time bring about this disease is just the same in its bearing as the inherited tendency to scrofula; that the tissues in which this disease is manifested are susceptible to it long before it is actually seen. These views were also concurred in by Drs. McQuillen and Morgan. He believed that this disease follows the long-continued use of mercury, and that it is transmissible to the children of those in whom it is manifested. The symptoms in the mouth are similar to those of scurvy, but the general indications are different. Dr. Rawls also stated his belief that pyorrhea alveolaris followed the persistent use of canned tomatoes. It is known that tomatoes will produce the same effect on the liver as is caused by mercury, and he claimed that his assertion as to the effects of tomatoes upon the gums was warranted by facts gathered from an experience of fifteen or seventeen years. It had also been observed that salt would cause the trouble alluded to. His conclusion was that there must be some element common to the three articles named which caused the difficulty. The only thing common to all of them is chlorine, and he believed that this in some form or in some way was the cause of the disease. We know that scurvy is usually caused by the exclusive use of salt meat, and that it can also be produced by the exclusive use of fresh meat in large quantities for a long time. As to the curative possibilities, it must be remembered that wherever a tooth is attacked by this disease it is denuded of its pericemental covering, and there can be no restoration until the parts are protected from every possible irritant, and that even the secretions may act as irritants. The speaker had heard it stated that the disease was curable by local treatment alone, and he has had patients who had been so treated and pronounced cured in whom he found the disease still existing; no re-attachment between the gum and tooth had taken place. He believed that a cure could only be effected by removing all sources of irritation and cutting away all the dead tissues, if we can be sure when we get down to the tissue which is not affected; but all the affected tissue must be removed. Unless taken away with instruments it will have to be passed off in the usual way. On the other hand, we hear men talk of medicines that will cure, as though when these were applied the whole system was changed. We also hear of antiseptics; but they do not cure the disease. They simply remove some of the causes without going to the root of the trouble.

Dr. Morgan agreed with most of what Dr. Rawls had said, but he must disagree with the statement that we cannot cure disease until we know the cause of it. There are diseases which we combat successfully every day of which we do not know the cause. Dr. Taft, Dr. Rawls, and the speaker might hold different views concerning the cause of disease, but they all treated it pretty much alike, and all treated it successfully. He thinks he has seen cases of pyorrhea alveolaris in persons who do not use the articles mentioned by Dr. Rawls as causing it. He would admit that where there is a tendency to this disease the exhibition of mercury would set it up; but we sometimes find it in persons of robust health. He had no doubt that it was curable—not by reproduction of the tissues, but in the sense that the parts not destroyed can be restored to comparative health. The present accepted treatment is based on the idea that when the broken-down structures are thoroughly removed nature throws out protoplasm, and we thus get an arrest of the morbid condition and reproduction. The tissue formed is not normal tissue, but it is normal scar-tissue. It is less highly organized and less liable to disease than the original tissue was. In the large majority of cases the disease depends on constitutional causes, and in many cases where there is no local pain the predisposition remains. Systemic treatment comes in as a helper in these cases.

Dr. Taft was not clear as to whether the systemic condition in these cases is peculiar, except there may be some form of enfeeblement. If Dr. Rawls's theory was correct, he should suppose that if patients would abstain from the use of mercury, salt, and tomatoes, the trouble would be abated in the course of time. As to whether chlorine in any form is the exciting cause, he thought was problematical. He apprehended that when pyorrhea alveolaris is observed about all that is necessary is a strengthening of the system. It is probably true that in many cases general treatment is not required, but in many others general treatment is necessary to strengthen the digestive and assimilative powers. As to the cause of the trouble, some maintain that it is local, and is due to microscopic organisms, and that when these are cleared away all is well, and such agents as peroxide of hydrogen are used, with marked success. It is a question whether the tissues in some cases ever return to their original condition. In others there is no perceptible difference between the primary and secondary tissues. We sometimes find replanted teeth as firm after three years as though they had never been disturbed. In other cases the secondary formation is of very little value. In such cases the new formation will be disintegrated after three, four, or five years, and the teeth will be expelled. There is a very great variety of phases in pyorrhea alveolaris, and it behooves the dentist to become just as familiar as possible with all of them and study the means for meeting each one in the best way. He doubted somewhat the transmission of a mercurial impression from one generation to another. The progeny of deteriorated parents will not be so good as that of the undeteriorated, but that the distinct impression is passed along he doubted.

Dr. Rawls thought if we believed that any qualities might be transmitted from parent to child, as color of hair or eyes, or shape of the nose, we must believe that it is possible for the effects of any medicine which has a general influence on the system may be transmitted.

Dr. Taft. It is true that constitutional peculiarities are transmitted, but they are inherent to the person. A peculiarity of the parent which is the result of accident is not likely to be transmitted to the child. The effects of the exhibition of mercury are accidental, and are not likely to be stamped upon the child.

Dr. F. Peabody, Louisville, was satisfied that Dr. Rawls's position with regard to the hereditary character of the disease was correct.

Under the speaker's observation cases had occurred which were strong evidence in favor of that idea. He had seen a case in which the same tooth in a mother and her daughter was affected in precisely the same way, and no other teeth in the mouth of either showed any sign of disease; another case in the mouths of a mother and son was of precisely similar nature. If these conditions were not transmitted, it was a little singular that there should be such exact coincidence in the character of the affection. Dr. Rawls's idea that pyorrhea alveolaris is of mercurial origin may be correct; if so, it is more the dying-out effects of the drug than the direct effects. If it is a blood disease, the speaker did not think it could be caused by tomatoes. That it is systemic is apparent, and that its expression is confined to the pericementum is also apparent. The treatment which is successful with many is to remove the necrosed edges of the alveolar process. When this is done we always find the gums heal up as readily as in cases of extraction; but that chiseling away the process will cause exudation of protoplasm he thought was extremely doubtful.

Dr. Rawls. When teeth are extracted there is weeping out of protoplasm, and the dead tissues have exit all the time the closing up is going on.

Dr. Patrick's experience was that securing absolute cleanliness, when the cases had not gone too far, was the only treatment necessary. He thought it was a local disease. Even those who claim it is a constitutional trouble treat it locally, which is a curious way to cure a constitutional disease. The best evidence that it is a local disease is that local treatment cures it. He does not believe much in its heredity.

Dr. Morgan, wished to say, lest his former remarks should be misunderstood, that he does not believe the disease itself is transmissible, but that the liability to it is. There is a predisposition on the part of the children of those whose teeth are affected with pyorrhea alveolaris, to take on the disease should circumstances favor it. This does not imply that all who inherit the predisposition are necessarily afflicted with the disease. That pyorrhea alveolaris is more prevalent now than it was twenty, thirty, or forty years ago, he is not prepared to accept as true; though we undoubtedly see more of it. Friction is a most valuable preventive, because it stimulates the parts, and necessarily keeps them clean. His observation was that while there are many cases where the bone is softened there are very few, comparatively, where there is actual necrosis.

Dr. H. A. Smith thought peroxide of hydrogen was the thing not to use in alveolar abscess and pericementitis, because free oxygen is essential to the life of the fungi of putrefaction and fermentation. Cleanliness is the sum-total of correct treatment.

Dr. A. Wilkes Smith. Is it not likely that accidental constitutional peculiarities are produced by surrounding circumstances or climatic causes? We often see young women of excellent physique and apparently in perfect health, in whom, after the birth of a child, there is a general breaking down. Is it not possible that this is sometimes the result of general constitutional conditions arising from climatic influences?

Dr. A. Berry, Cincinnati. One hundred years ago pyorrhea alveolaris was called conjoined suppurative inflammation. It is common now, and was common then, and then as now was too often neglected. Dentists should be better acquainted than they are with the earlier stages of this trouble. As to the treatment, if the patient has not enough faith in your ability to stand the heroic treatment which is required, don't attempt the case. You must do the work thoroughly, removing every particle of diseased tissue,—or let it alone.

The subject was passed and the association adjourned.

THIRD DAY.

No morning or afternoon session was held. During the morning hours the members of the association visited Ashland, the former home of Henry Clay, and were handsomely entertained by its present owner, Major McDowell.

Evening Session.

The evening session was mostly devoted to routine business.

A brief paper on "Dental Literature," by Dr. B. H. Teague, of Aiken, S. C., was read by the secretary.

A committee, consisting of Drs. Fountain, Winder, and Smith, appointed by the chair for that purpose, reported suitable resolutions regarding the death of Dr. J. W. Locke, of Troy, Ala., a member of the association. The report was adopted.

After the passage of the usual resolutions of thanks, the association proceeded to the election of officers for the ensuing year, with the following result: A. O. Rawls, president; W. R. Clifton, first vice-president; T. Sollers Waters, second vice-president; B. H. Catching, third vice-president; J. L. Fountain, corresponding secretary; R. A. Holliday, recording secretary; H. A. Lowrance, treasurer.

New Orleans was selected as the place for the next meeting.

The association then adjourned to meet the last Tuesday in March, 1885, at New Orleans.

INDIANA STATE DENTAL ASSOCIATION.

The Indiana State Dental Association held its twenty-sixth annual meeting in the lecture-room of the Indiana Dental College, Indianapolis, commencing Tuesday, June 24, 1884, and continued its sessions three days.

The following officers were elected for the ensuing year: J. W. Jay, president; F. M. Hamsher, first vice-president; D. L. Overholser, second vice-president; Merit Wells, treasurer; R. W. Van Valzah, secretary; J. Richardson and S. T. Kirk, board of examiners.

It was decided to hold the next meeting at Maxinkuckee, on the last Tuesday in June, 1885.

R. W. Van Valzah, *Secretary*, Terre Haute, Ind.

SOUTHERN DAKOTA DENTAL SOCIETY.

The Southern Dakota Dental Society held its first annual meeting in Pierre, commencing Wednesday, June 11, 1884, and continued its sessions for three days.

The following officers were elected for the ensuing year: C. W. Stutenroth, president; J. M. Gross, first vice-president; F. O. Sale, second vice-president; W. H. Barker, secretary; C. R. Watt, treasurer; A. E. Steere, librarian; W. B. Steere, C. W. Stutenroth, and W. H. H. Brown, board of examiners.

This promises to be a prosperous society, its active membership already numbering twenty-one.

It was resolved to hold the next meeting at Huron, to commence on the second Tuesday in June, 1885.

F. O. Sale, *Secretary*, Huron, Dakota.

NORTH CAROLINA STATE DENTAL ASSOCIATION.

The tenth annual meeting of the North Carolina State Dental Association was held in the Senate Chamber at Raleigh, June 17, 18, and 19, 1884.

Unusual interest was shown throughout the sessions. The attendance was large and many young members of the profession joined.

The officers elected for the next year are as follows: J. H. Durham, president; C. J. Watkins, first vice-president; J. E. Matthews, second vice-president; Thos. M. Hunter, secretary; J. W. Hunter, treasurer; W. H. Hoffman, M. A. Bland, and J. F. Griffith, executive committee.

The next meeting of the association will be held in Charlotte, the first Tuesday in June, 1885.

Thomas M. Hunter, *Secretary*, Fayetteville, N. C.

NEW JERSEY STATE DENTAL SOCIETY.

At the meeting of the New Jersey State Dental Society which convened at Asbury Park, July 16, 1884, the following officers were elected for the ensuing year:

J. W. Scarborough, president; W. Price Richards, vice-president; Charles A. Meeker, secretary; Geo. C. Brown, treasurer. The above officers also constitute the State board of dental examiners. Charles A. Meeker, D. D. S., *Secretary*,
Newark, N. J.

EDITORIAL.

INDIANA DENTAL COLLEGE—CORRECTION.

Two important facts appear in the appended communication from the secretary of the Indiana Dental College. The first of these is that the Dental Cosmos erred in its statement of the ground of the refusal of the Illinois State Board of Dental Examiners to accept the diploma of the Indiana College as *prima facie* evidence of its holder's ability to practice dentistry. The misstatement was not an intentional misrepresentation of the course of the college, and it is both a duty and a pleasure to correct it.

The second fact is that the Indiana College wheels into line with the other schools, and will hereafter insist that candidates for its diploma shall have attended two full courses of lectures—five years of reputable practice being accepted in lieu of the first term. See advertisement of the college in current number.

Indiana Dental College, Secretary's Office,
Indianapolis, July 5, 1884.

To the Editor of the Dental Cosmos:

Dear Sir:—Permit me to call your attention to a misstatement in your editorial regarding this college in the Dental Cosmos for July, page 438. This college has always required attendance on a full course of lectures and demonstrations before graduation. The Illinois Board based its refusal on the ground that this college did not require *two* full courses, or one course after five years' practice. This college has never indulged irregular methods. Our work has all been straight and honestly done. The decision of Judge Scholfield settles the question for us, and hereafter we will conform to the two-term rule.

Very truly yours, J. E. Cravens, *Secretary*.

GROSS PROFESSORSHIP OF PATHOLOGICAL ANATOMY.

The Alumni Association of Jefferson Medical College has inaugurated a movement to secure, in some medical school, the endowment of a memorial professorship, to be designated "The S. D. Gross Professorship of Pathological Anatomy." Contributions may be sent to Dr. R. J. Dunglison, treasurer, Lock Box 1274, Philadelphia, Pa., and will be acknowledged in the columns of the Philadelphia *Medical News*.

EXCURSION TO PORTLAND, OREGON.

Dr. G. W. Klump, of Williamsport, Pa., now in Chicago, is arranging for an excursion to Portland, Oregon, especially for dentists and their friends. Further information may be obtained by addressing Dr. G. W. Klump, Lakeside Building, Chicago, Ill.

OBITUARY.

DR. MORRIS LEVETT.

Died, recently, at his son's residence, Paris, France, Dr. Morris Levett, in the eightieth year of his age.

Dr. Levett was born in London, but came to America in 1835, and practiced dentistry for over forty-three years in the city of New York, where he enjoyed quite an extensive patronage up to 1878. When Dr. Isaac Greenwood retired, in 1844, he sent Dr. Levett many of his former patients, and gave him a recommendatory certificate. It is claimed that Dr. Levett, though not the inventor, was the first in America to introduce the principle of atmospheric pressure as applied to artificial teeth. In 1856 he introduced a modification in cavity plates, consisting of small air-chambers arranged over the ridge at short intervals, as mentioned by Dr. Richardson in his work on "Mechanical Dentistry."

HINTS AND QUERIES.

One of my patients is troubled so much with grating his teeth, at night while asleep, that he is injuring their surfaces very much. Will you permit me to ask through "Hints and Queries" if there is any appliance or remedy for preventing it?—Willis J. Bickford, *North Attleborough*, *Mass.*

Having observed recently two or three cases of intercostal neuralgia among dentists, I am led to inquire if it is an affection to which the dentist is peculiarly subject, and if so, to what is it probably due? May it not be superinduced by the constrained position he is frequently obliged to occupy in operating on the under surfaces of the upper teeth? In all the cases observed the left side alone was affected; a fact which seems to make the theory more reasonable.—F. S. H.

To the Editor of the Dental Cosmos:

In the March number (1884) of the Dental Cosmos, under "Hints and Queries," your correspondent E. C. B. asks what course to pursue to restore dark teeth to their natural color. My practice for many years has been to use *diluted sulphuric acid*, with finely pulverized silex or pumice. It never fails of a good and satisfactory result; and there is nothing better in the treatment of what is known as "Riggs's disease," which is nothing more nor less than diseased gums from the effects of a foreign deposit on the teeth, which increases until often the process becomes diseased from the corroding effect of the matter generated in the gums. My experience for more than twenty-five years has established the fact definitely, to my mind, that sulphuric acid, rightly used, can never do injury to healthy tooth-structure; and it surpasses all other remedies known to dentists in the treatment of diseased gums and alveolar processes. If any are doubtful, let them experiment and they will be convinced.—B. F. ARRINGTON.

TO THE EDITOR OF THE DENTAL COSMOS:

The following letter from Dr. Adolf Petermann, of Frankfort-on-the-Main, Germany, a graduate of the Philadelphia Dental College, addressed to the Deans of the Dental Colleges of the United States, has been sent to me for translation, with the request that it should be published in some of the American dental journals. I accordingly ask a place for it in the DENTAL COSMOS.

F. H. REHWINKEL.

To the Deans of the Dental Colleges of America:

GENTLEMEN: I learn from the April number of the DENTAL COSMOS, page 247, that a call has been issued for a meeting, at the city of New York, of the faculties, or their representatives, of all the dental colleges in the United States, for the purpose of adopting a uniform standard of graduation.

The warm interest, gentlemen, felt by myself in your colleges induces me to address you, and to take the liberty of calling your attention to some strange anomalies connected with the graduation of candidates from foreign countries, and particularly those from the German Empire. These irregularities, in the interest alike of the dental profession and of the colleges, demand an immediate and radical reform. I therefore embrace the opportunity this meeting at New York affords of speaking to you thus assembled. I would entreat a serious consideration, on your part, of the complaints made throughout Germany against some of your colleges, and a due appreciation of the necessity of your adopting such measures in your methods of graduating foreigners as shall be consistent with the rules enforced in regard to native-born graduates.

I have before me an article, written by J. L. Tierney, D.D.S., a native American graduate of one of your dental colleges, which was published in the *Independent Practitioner*, 1884, page 241.

Dr. Tierney calls attention to the deplorable state of affairs which now exists, and which has been brought about in consequence of an injudicious bestowal of diplomas by some of the American colleges upon unqualified foreigners. He furnishes several instances in corroboration of his complaint that dental colleges graduate foreigners wholly lacking even the rudiments of an education—oftentimes those who can neither speak nor understand the English language, after a sojourn in America of from four to five months, and an attendance upon one course of lectures. As a consequence, it frequently occurs that men, who previous to their graduation occupied in their own country the most subordinate positions as barbers, corn-cutters, or journeymen in dental laboratories, return home after a few months' absence in the United States with the title of D. D. S. appended to their names, and a diploma certifying the same, from a reputable American dental college.

Personal knowledge of many such instances compels me to add one as corroborating testimony to the truth of these statements of your own countryman. The case in question is of quite recent date. A person, originally a barber's assistant, and a short time before his departure employed in a dental laboratory to do the most ordinary mechanical work, left this city for America. After his matriculation in a certain college, he attended lectures for the space of four months; from November until February, and at the end of that time was graduated a D.D.S. This man neither speaks nor understands English, and is barely able to read a few words in that language. Under these circumstances, how was it possible for him to comprehend the didactic lectures on scientific subjects which he listened to in the American class-rooms?

There are quite a number of persons, with just such qualifications as those above mentioned, practicing in this country as American Doctors of Dental Surgery, graduated by legal and reputable colleges. These men would not even have been permitted to matriculate in a German university; much less would they have been admitted as candidates for the State examination. How can it be possible for illiterate persons, who cannot express themselves correctly in their own mother-tongue, to be benefited in any appreciable way by listening to a lecture the subject-matter of which is far beyond their mental grasp, and pass a successful examination in an American college, with no previous knowledge of the language before their arrival in America? How can it be possible for these foreigners, with their linguistic disadvantages and lack of general education, to acquire in from four to five months sufficient knowledge for graduation, when you exact from your native students a two or three years' course? I must agree with Dr. Tierney, when he says, in the article before quoted, that "these five-months doctors must be regarded, if not in the manner of their graduation, at least in fact, and in the amount of their acquired knowledge, as those are who hold their diplomas from John Buchanan or the Wisconsin Dental College."

It cannot surprise you, gentlemen, that German dentists who, although not possessed of titles, have passed through the trying ordeal of a rigorous examination, and have obtained the approval of the State, refuse to acknowledge as colleagues this class of American Doctors of Dental Surgery.

The German public can have but one opinion in regard to the integrity of American dental colleges, when it sees, again and again, men returning from America, after a five months' absence, as Doctors of Dental Surgery who, previous to that time, had been known to them as ordinary workmen, holding in some instances very menial positions.

We have in Germany a considerable number of superior American dentists, who of course are the chief sufferers. In consequence of these unfortunate circumstances, their professional standing is belittled and the value of their D.D.S. very much impaired.

The whole world, and Germany not least, has appreciated and acknowledged its obligation to the dental profession of America, for the progress it has made and for its successful efforts to promote dental education, and through that to raise what was once a mere craft to an honorable place among the professions. Your dental colleges were for a long time considered the high schools for dentists. And those dentists held a high place in the esteem of the public and among their fellow-practitioners, who in addition to a university education in their own country had enjoyed the advantages afforded by an American college. In consequence many educated dentists have heretofore availed themselves of the opportunities offered by American dental colleges for perfecting their professional education. But at present things are very much changed in this respect. Of late years many persons who have gone to America to obtain diplomas have been either possessed of no education, or were deficient in its most essential parts, who went abroad less for the purpose of storing their minds with the knowledge necessary for professional success than to obtain the D.D.S. in the shortest possible time.

This pernicious practice, which has already greatly injured the reputation of your colleges, if continued will entirely destroy the confidence of German students in the worth of American dental diplomas. The educated dentist, who might desire to go to America for the purpose of enriching his knowledge and experience at one of your colleges, is deterred by the thought that he must be brought into contact with and be placed upon a par with persons whom he cannot recognize as equals and colleagues.

I believe, gentlemen, I have given you a brief and correct statement of the situation. I cannot doubt that your interest in dental colleges is as warm and sincere as my own. Pardon me, therefore, for urging you to give this matter your earnest attention, and to devise some means whereby this deplorable state of affairs shall cease to exist; so that hereafter only thoroughly qualified students shall be graduated, and that all candidates for graduation who have not gained the approbation of their own State and country, or those who have not obtained at least a preparatory education in one of our universities, shall not be graduated until they have been regular attendants upon the full courses of lectures for several years, and have given positive evidence of fitness to receive a diploma by their ability to pass a severe examination. It is only by such a course, strictly adhered to, that you can regain for your colleges that prestige which they formerly enjoyed in foreign countries.

With profound respect,

ADOLF PETERMANN, D.D.S.

Frankfort-on-the-Main, May 21, 1884.

THE

DENTAL COSMOS.

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PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION—TWENTY-FOURTH ANNUAL SESSION.

FIRST DAY—*Morning Session.*

THE twenty-fourth annual session of the American Dental Association was convened in the Town Hall, Saratoga Springs, Tuesday, August 5, 1884, at 11 o'clock A.M. President E. T. Darby in the chair.

The morning session was devoted to routine business, among which was the adoption, on motion of Dr. Cushing, of an amendment to the constitution providing for a more efficient organization of the various Sections.

The president, Dr. Darby, then delivered the annual address, of which we make the following abstract:

After a brief history of the organization of the association in 1859, and a statement of its objects, he paid a deserved tribute to those who maintained an active interest in its work; alluded feelingly to the death of Dr. Buckingham; noticed the rapid progress in the arts and sciences, and the changes in the profession which have transpired during the existence of the association. The number of practitioners has increased from four thousand to twelve thousand; dental societies from twenty to one hundred; dental colleges from three to twenty (including universities which have dental departments); laws regulating the practice of dentistry, then unknown, have been enacted in nineteen States; the literature of the profession has kept pace with its numerical growth. Alluding to the rapid increase in the number of dental schools, he noted as a serious objection to further additions the want of adequate support for those already in existence; the tendency, so long as the colleges were dependent upon the fees of students, to accept matriculates irrespective of their qualifications, and urged a rigid, uniform, and systematic preliminary examination, which should embrace all the qualifications constituting fitness for the study and practice of dentistry; considered that the great need of the schools was endowments adequate to their support,—the endowment of professorships enabling the incumbents to devote their entire time to instruction. He said the tendency at present seemed to be the establishment of dental departments in connection with universities or medical schools, and where such institutions are located in or adjacent to large cities, from which to draw a large clinical supply, and where the parent school is able to bear a large share of the expense and contribute to the facilities for instruction, such a union seems to promise well; but such a wedlock demands a thorough appreciation of the relationship which dentistry sustains to general medicine, and is based upon the belief that dentistry is a specialty of medicine. If such be true, it seemed to him that at no distant day such schools should demand the same qualifications which entitle the candidate for graduation to the single degree of medical doctor. Not that such qualifications are absolutely essential to the intelligent practice of the dental specialty, but because of the increased culture which such a course would afford. Alluding to the service rendered to the cause of dental education by many connected with the dental schools, and to the fact that their labor has been largely one of love and without adequate compensation, Dr. Darby thought that the association, while quick to recognize apparent shortcomings on the part of those engaged in college work, had not been as ready to give proper encouragement to the pioneers of dental education. It had, however, from the first, encouraged greater requirements on the part of colleges, and adopted resolutious making it obligatory as a condition of representation here that all schools should demand attendance upon two full courses of lectures. He considered it a pleasing augury for the future that a meeting of the faculties of the various dental schools has been called to fix upon a uniform standard of graduation; and it is to be hoped that within another year the candidate for a dental degree must have spent at least two years, or attendance upon two full courses of five or more months each, in a reputable dental school before being eligible to graduation. Another cause for congratulation he found in the fact that so many States have enacted laws regulating the practice of dentistry within their borders. He indorsed the action of the New York State board in the position that it was their right to determine whether the graduates of certain colleges should be allowed to practice within their commonwealth. If dental schools are lax in their requirements, and graduate men in disregard of the requisite fitness, the State should compel such men to give evidence of their qualifications. He argued that the examining boards should be as rigid in their requirements as are the faculties of dental schools, but considered that an examining board should not grant degrees, thus putting itself in competition with dental colleges, while condemning them for granting diplomas without attendance upon a prescribed curriculum. He alluded with pride to the scientific work which was being done by the profession in America, and to the marked progress in every direction which had been made by the profession during the past quarter of a century. He noticed at some length the relation of the association to the profession, its national character, and the work which it has accomplished; alluded to the change in the work of the association from standing committees to sections, and was convinced that as much has not been accomplished under the present system as under the old one of standing committees, and concluded by expressing the belief that the needs of the association could be embraced in one comprehensive sentence—more honest work, less adverse criticism.

On motion of Dr. J. G. Ambler, of New York, a committee, consisting of Drs. J. G. Ambler, John Allen, and J. Taft, was appointed to draft resolutions expressive of the feeling of the members of the association with regard to the death of Dr. T. L. Buckingham.

A committee, consisting of Drs. E. Parmly Brown, A. W. Harlan, M. W. Foster, J. Taft, and G. W. McElhaney, was appointed to take into consideration the suggestions of the president's address.

Adjourned to 8 o'clock P.M.

Evening Session.

On motion of Dr. F. M. Odell, Wednesday evening was set apart for hearing a paper by Dr. J. L. Williams, on "Some Disputed Points in the Histo-Genesis of the Teeth."

Section VI. was called, and Dr. A. W. Harlan, Chicago, chairman, read the following report:

* * *

The mass of the profession are so likely to confound with pyorrhea alveolaris salivary deposits on the lower incisors, or such deposits on the buccal, palatal, or lingual surfaces of molars, that it seems necessary to restate the fact—apparent to all close observers—that salivary concretions are only in slight degree, strictly interpreted, the cause of or associated with pyorrhea, except as shall be hereafter alluded to. In many incipient cases a careful examination discloses the fact that there is only a slight recession of the gums surrounding the necks of affected teeth; in others none at all. In those cases recognized to be of longer standing may be observed a blunting of the septum of gum lying between the teeth, with a tendency to bleed on slight provocation, especially between the molars and bicuspids. In all cases where the discharge of pus is abundant on pressure being applied, the loss is observed of more or less of the bony process surrounding the root of the tooth, its symmetrical outline disappearing irregularly. This accounts for the varying depth of the pockets. Where the process is thinnest normally there will be found the most extensive destruction of bone.

Pyorrhea alveolaris is not a disease of old age any more than it is a disease of youth or middle age. I have seen it in at least one case as early as the ninth year, and several times before the sixteenth year. From the number of cases of true pyorrhea recognized I am unable up to this time to say at what period of life it is most frequently observed. My personal experience leads me to think that more cases are to be found between the ages of twenty-five and forty-five, but I have no reliable data to establish this. The thoughtless and ignorant extraction of teeth by those not competent to observe, neglect to consult a dentist at the proper time, failure to impress those persons suffering with pyorrhea by the dentist into whose hands they have intrusted themselves, lack of means to secure proper attention at the right moment, and other causes not necessary to enumerate, all tend to prevent even an approach to the truth. It is to the future that we must look for statistics of age, sex, and the condition of the general health, the teeth most likely to be affected, etc. Pulpless teeth in the few cases I have seen do not escape its ravages. Users of tobacco are not less liable to suffer than those who do not habitually use it. The worst cases I have seen were those where tobacco had never been used. Long-crowned teeth, slender teeth, teeth with small necks, and teeth which have been separated by files and disks, and not properly cared for afterwards, teeth pretty generally free from extensive caries, teeth of mouth-breathers, are the ones most liable to be affected by pyorrhea. Teeth which have lost their antagonists early are not often affected. After the inception of the disease teeth which are normally even and regular in their appearance change position, become twisted in their sockets, spread laterally, protrude over the lower lip (the central and lateral incisors) and if a tooth should be extracted through thoughtlessness or ignorance, the contour of the mouth may be changed. The teeth may even overlap each other, or a tooth may be pushed out of line. It is not possible without taking too much space to say how many deviations of position have been observed.

The fact cannot be too strongly reiterated that the vast majority of cases of pyorrhea are seen uncomplicated with salivary deposits. The writer is supported in this view by such observers as Black, Ingersoll, Witzel, Walker, and others who are well recognized as authorities. I have seen, in a number of cases, salivary deposits on the inferior incisors and on the buccal surfaces of superior molars, yet the remaining teeth were found free from such incrustations and still the patient suffered from true pyorrhea. Several cases have shown a tendency to the deposition of salivary calculus on certain teeth while undergoing treatment. The dentist not in search of these cases will frequently be deceived by the appearance of the gums, as not many cases present an inflamed or thickened margin; few cases are to be seen where the *ligamentum dentium* has completely lost its hold on the neck of the tooth, and fewer still where the gums present a pale, flabby appearance. Many cases are seen where the gum has a purplish color, of various shades, corresponding to the outline of the pocket beneath. Pockets may be seen on the labial surfaces of the anterior teeth before the destruction of the alveoli has begun. This statement is based on the examination of cases known to be in their incipiency. The writer, having no desire to unnecessarily lengthen this paper, refers his interested readers to the undermentioned papers for various conflicting views on the pathology of pyorrhea.[*]

I do not pretend to discuss the causes of pyorrhea at this time. Later I may have something to communicate on this subject.

TREATMENT.

Instruments. Experience has shown the necessity for possessing three probes of extreme delicacy for examining the pockets: first, for their depth and width; second, for detecting serumal deposits on the roots, and third, to discover the condition of the edges of the alveoli. The probes should be smooth-pointed, so as to not lacerate or wound the gums. Previous to using them the mouth should be thoroughly cleansed by syringing it with tepid water, and the gums dried with bits of paper, fibre lint, or spunk. When the condition of the gums, roots, and alveoli has been ascertained the plan of procedure must be determined. When there are salivary deposits they are to be removed at the first sitting, and the patient furnished with:

℞.—Pinus canadensis (white), ʒ ss.
Aquæ rosæ, ℥ iijss.
Eugenol, ♏ xxx.
M.

Sig. Use thrice daily for six days on a badger tooth-brush.

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[*] L. C. Ingersoll, "Alveolar Ulceration," Transactions Ill. State Dental Society, 1880. G. V. Black, "Phagedena Pericementitis," 1882. A. Witzel, "Infectious Alveolitis," *Brit. Jour. Dent. Science*, Feb., March, 1882. J. Arkövy, J. Iszlai, J. Walker, W. H. Atkinson, Vol. III., Transactions International Medical Congress, London, 1881. A. W. Harlan, Dental Cosmos, October, 1883. G. A. Mills, Dental Cosmos, 1879, *et seq.*, *Missouri Dental Journal*, 1882 or 1883, and others of a more or less fragmentary nature.

If there are more than four teeth affected I do not as a rule attempt to remove the serumal deposits (if such are present) from all at the first sitting, but reserve them for the second appointment, which must be made on the fourth succeeding day. Then include the four following, and so continue until the whole number have been thoroughly treated.

The instruments necessary for the removal of serumal deposits which please me best are known as Cushing's scalers (made by The S. S. White Dental Manufacturing Co.). I have added to my set several others, so that with ten or twelve instruments—all necessitating a *pushing* motion—I am well equipped for the removal of any deposit on the root of a tooth, or in the bifurcation of a root. In addition to the above, two or three small spoon excavators are necessary for scraping and excising the edges of the alveoli, when it is not possible to accurately bur the edges with an instrument run by the dental engine. Where the teeth are widely separated, instruments of grosser caliber may be used. An ordinary hypodermic syringe with any approved point is also necessary. There should be points of at least three differing angles, in addition to one straight one; these points should not be too sharp. I use one syringe for injecting H_2O_2 *exclusively*. Two syringes are all that any one needs. The pockets are injected with H_2O_2 immediately following the removal of the deposits and the excision of the edges of the process. Any guaranteed peroxide of hydrogen may be used. It should be kept in a cool, dark place, in a glass-stoppered bottle which has been covered with a dark-blue paper. One ounce is all that is necessary to keep in the case for daily use. I use almost exclusively iodide of zinc in solution of water—from three to forty-eight grains to the ounce,—beginning with the stronger solutions in the worst cases by injecting two to four drops in each pocket, and gradually decreasing the strength until the cessation of treatment. The above solutions are injected immediately following the injection of H_2O_2. I have been using eugenol and sanitas oil much diluted with oil of wintergreen or sassafras in place of ZnI_2, but I am not yet ready to report on their effectiveness.

I direct the patient to refrain from brushing the gums with a stiff brush and from fingering or squeezing them during treatment. I discontinue the use of the Pinus canadensis prescription when I begin the treatment of the pockets. Loose teeth are wired together with fine binding wire (tinned); or silver, platinum, or gold wire may be used. The patient in the beginning is required to appear once in four days. When constitutional treatment is called for, which is seldom necessary, the patient is placed under such appropriate treatment as the case demands. The injection of H_2O_2 is discontinued when suppuration has ceased. I frequently prescribe for use at this time a dentifrice in the form of a paste, as follows:

℞.—Precip. chalk,
Powd. Orris root, aa, ℥ ii.
White castile soap,
Powd. Borax, aa, ℥ ss.
" Myrrh, ʒ ii.
Honey and glycerin, q. s. to make a soft paste.
Color rose pink.
Perfume to suit.

To be used before retiring and after breakfast on a brush not dipped in water and not too stiff.

If desired or needed I add to the prescription twenty drops of eugenol. Generally this oil will be found a desirable addition. After the fourth or fifth visit the interval between appointments may be lengthened to a week, then to ten days, and finally to two weeks.

As elsewhere stated,* I have found that in all acute cases of pyorrhea associated with pain, iodoform made into a paste by adding oil of cinnamon or eugenol until of the consistence of thick cream is an excellent anesthetic. It is used by packing the paste into the pockets, directing the patient to return in three or four days. I have had equally good results in painful cases from the injection of weak solutions of chloride of aluminium, one to three grains to the ounce of water. As soon as the inflammation has subsided these are to be discontinued.

I have no doubt that there are other equally useful remedies in this stage of pyorrhea (iodo-chloride of zinc, chinoline tartrate, saturated solution of iodine in wood creasote, iodoform and eucalyptus, dilute alcoholic solution of menthol, etc.). However, from a long and persistent use of the medicaments first mentioned, up to date, I give them the preference. During the period of consecutive treatment of these cases the patient must keep the mouth scrupulously clean and pay attention to correct rules of hygiene.

The practitioner who desires to succeed in curing pyorrhea must be a heroic surgeon, and a faithful therapeutist. Lacking enthusiasm, faithful work, or failure to impress the patient with the necessity for strictly following his directions, he must fail; but believing in the treatment he proposes and fully conscious of its importance, he must patiently proceed in the face of all obstacles, neglecting nothing essential to a complete success.

Eugenol and Sanitas Oil.

By request of Section VI. the chairman was deputed to present a brief statement of the properties and uses of eugenol and sanitas oil.

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* Dental Cosmos, October, 1883.

Eugenol is one of the active principles of oleum caryophylli, and is known in the Dispensatories and by chemists as eugenic acid. It is prepared by decomposing eugenate of potassium with sulphuric acid, and is afterwards rectified, when a colorless oil of the specific gravity of 1.076 is obtained. It has an odor of oil of cloves intensified, and possesses a sharp and penetrating taste. The chemical composition is $C_{10}H_{12}O_2$. It is not decomposed at ordinary temperatures, and has no tendency to become thickened by exposure to the air or to precipitate a sediment. It may be diluted with water—which is preferable—or with alcohol. Its potency as a parasiticide is retained best in aqueous solution.

The dental uses of eugenol so far have been limited. When applied to an exposed or nearly exposed pulp the pain from exposure is greatly lessened and frequently ceases altogether after a minute or two. If the cavity has been washed with a solution of sodæ biboras previous to its application, it is probably the best dressing for a slightly inflamed or congested pulp that we possess, not excepting the various iodoform pastes. It may be injected through a fistulous tract and the root sealed at the apex immediately in all alveolar abscesses of recent occurrence, no further treatment being necessary; but it is imperative that the root should be thoroughly filled. I have injected two drops into the interior of an epulis and in three weeks the epulis had disappeared. As a dressing for root-canals after the removal of a recently destroyed pulp, it will and should supersede all of the powerful coagulators of albumen. Diluted with water—1 part of eugenol to 1000—it is an elegant and agreeable dressing injected into the pockets of pyorrhea, and may be substituted in that proportion for H_2O_2 in cleansing the pockets. With proper precaution it may be injected full strength into a blind abscess after it has been cleansed by using H_2O_2. In such cases the root-canal should be sealed loosely with cotton saturated with it. Other uses of eugenol will suggest themselves to those who are engaged in experimental therapeutics.

Eugenol in full strength will coagulate albumen. It is a powerful germicide, and not dangerous to human life, as the ordinary dose is much larger than would be used in treating a dozen abscesses at one sitting.

Sanitas oil is obtained by the oxidation of oil of turpentine floating on water by directing a stream of heated air on its surface. It contains camphoric acid and peroxide of hydrogen. The oil possesses oxidizing powers equal to a ten-volume solution of H_2O_2 and may be considered to be a convenient method of storing H_2O_2, as we have in this product a germicide of the first rank combined with a volatile oily dressing, which is disinfectant, antiseptic, and not poisonous. It is non-irritating and has an odor similar to fresh pine, which is not disagreeable. The odor may be disguised by adding either of the oils of gaultheria, cinnamon, or sassafras. Eugenol or eucalyptus will not disguise the odor except in larger volume than the sanitas.

It has been used to inject pyorrhea pockets; in the treatment of alveolar abscesses,—non-fistulous,—and as an ingredient of mouth-washes; for dressing foul ulcers, wounds, ulcerated sore throat, and as a dressing over exposed pulps, and for injection into abscessed antra. It is soluble in alcohol and ether, and some of the essential oils,—not readily so in the latter. My use of it has been confined to sixteen cases of various forms of alveolar abscess—so far with success,—and semi-occasional use of it in the above-mentioned list of diseases.

Both eugenol and sanitas may be procured in this country—Schuchardt's and Merck's eugenols are reliable, and sanitas is manufactured by the Sanitas Co., of London, England. Sargent of Chicago imports both substances.

Dr. F. M. Odell, New York, had only observed one point in the reading to which he took exception—Dr. Harlan seemed to oppose manipulation of the gum and to favor letting the drugs applied do the whole work. The speaker had had some cases where manipulation of the gum seemed to be the only thing that would keep up the reparative process. One case in particular he recalled which seemed to progress well for a time towards a cure, except at one point, which obstinately refused to yield to treatment, and then it would all break loose again, and treatment would have to be begun over again. At last he enlisted the assistance of the patient in keeping up manipulation of the gum, and supplemented the treatment by the galvanic current, when the case went on without accident to a cure; but all the drugs that were applied apparently had no effect on this particular portion of the mouth. There seemed to be a sort of necrosis of the process, and the application of the galvanic current appeared to be the proper course. He might state that Dr. Bödecker was engaged in a series of experiments in this direction, and when they were completed the results would be made known.

Dr. E. A. Bogue, New York, would ask Dr. Harlan why at a certain stage of the treatment he uses Pinus canadensis, and why he recommends powdered myrrh in the prepared chalk prescription.

Dr. Harlan. The paper says that the prescription was made for use following the removal of the salivary deposits, and is then to be continued for a few days, but it is not used with reference to the pyorrhea. So much for the Pinus canadensis. With reference to the powdered myrrh in the paste, the quantity is so small that it may be left out without harm.

Dr. Bogue rejoined that it seemed to him that if in these cases it was necessary to remove all deposits from around the teeth, it was, to say the least, unphilosophical to use agents that would have a tendency to cause other deposits. Both of the drugs mentioned are precipitated by water, and by just so much as they are precipitated increase the possibility of the formation of new deposits. He had noticed for many years a tendency to prescribe tincture of myrrh in these cases, and he never could find out what it was for.

Dr. Harlan. Did Dr. Bogue ever use a tooth-paste of which myrrh was an ingredient?

Dr. Bogue. Not consciously. I use glycerin in its stead.

Dr. Harlan had used such a preparation himself, and he had not noticed any deposit of myrrh on the gum—at least any that would remain. However, if the myrrh was objectionable it might be omitted from the prescription.

Dr. W. C. Barrett, Buffalo. Until we have the etiology of this disease made clear we will not be fully prepared to combat it. Is the seat of the disease in the tooth, is it in the alveolus, or is it in the pericemental membrane? It has seemed to him that the cases which give most trouble were those in which there was an affection of the alveolar border. In these the simple removal of the deposits around the necks of the teeth was not sufficient to reach the bottom of the disease, and his treatment has included the removal of the border down to sound tissue. He believed that the alveolar walls were affected, in all serious cases of pyorrhea, by a sort of wasting away or necrosis. Until he had removed the carious bone and set up a line of demarkation he had never yet succeeded in curing such cases, but when that was done the after-treatment was simple and the disease progressed readily to a cure. The remedy which had been most effective in his hands was chloride of zinc; he had also used the iodide with good results, but nothing so stimulates the production of healthy tissue as the chloride. He had used it of all strengths, from a saturated solution to extreme attenuation, as the case seemed to require. He keeps a saturated solution and from that makes what he desires. He never measures the exact strength; fixing the proper proportion for a given case is a matter of experience.

Dr. W. H. Atkinson, New York, thought that the point of discrimination between pyorrhea and that trouble which comes from salivary deposits under the gum was not fully taken in by those who heard the paper read. For this discrimination the paper was to be commended, but he objected to this harping upon one remedy in an empirical way. Many do not properly discriminate between an escharotic and a stimulant. An escharotic burns up or cooks, so to speak, the tissue to which it is applied, while a stimulant supplies it with increase of functional power. What we want to do is to study nature's process of reproduction. After coagulation of the albumen, which from the analogue of the decidua-reflexa, inclosing the debilitated territory, the first step is a return to the embryonic condition, following which come differentiation of the tissues and their building up and nutrition. This process of stimulation, if continued beyond the point of normal nutrition, becomes inflammation; but if not pushed beyond this point the reproduction of the part goes on after the typal demand. As before said, we need to discriminate between the cooking of the tissues and the physiological hardening of the parts. Twenty grains of the chloride of zinc in an ounce of water gives just the coagulation which occurs in the natural production of the embryo. He did not know what a saturated solution of chloride of zinc might be; he had kept on adding the chloride until a thick paste resulted, but he would not call that a saturated solution. Elixir of vitriol and a solution of aqua regia one part and water seven parts makes the best coagulant he knows of for that retrogression which is called wasting of the dentium ligamentum. That pyorrhea is a local trouble he thinks is proved by the course taken. The teeth most liable to be affected are the single-rooted teeth, the incisors and cuspids. All who have studied the subject closely will say at least that it has a local expression. He indorsed what Dr. Bogue said concerning the gummy deposit of myrrh, but he was not afraid of its doing harm.

Dr. L. D. Shepard, Boston, had a practical case to report in this connection which he thought would prove interesting. The patient, who was brought to him by a surgeon, was suffering from specific disease, and the continued use of mercury had developed a severe case of ptyalism, which the surgeon could not control. The mercurial treatment had been stopped, and the patient was brought to him to know if the teeth had anything to do with the persistence with which the ptyalism resisted ordinary means of cure. The patient's teeth had been recently put into condition by another dentist. On examination he pronounced it a case of pyorrhea, and the patient was left in his hands for treatment. Pus could be expressed from the free margins of the gums, and the discharge was so profuse at night as to leave a stain on the pillow the size of the palm of the hand. The only treatment was the surgical removal of the deposit which caused the trouble, and syringing under the gums with dilute aromatic sulphuric acid. In two weeks the pyorrhea was cured and the patient was turned over to the surgeon from whom he came, and the mercurial treatment was renewed without recurrence of the ptyalism. In this case the deposit which caused the trouble was very slight, and probably but for the complication with the mercurial treatment would not have attracted attention. This was only one of a number of cases which had led him to continue in the belief he had held for years that this disease is largely local, is largely due to external causes which are local in their action, and is cured in the great majority of cases by surgical treatment, without the application of therapeutical remedies except as involved in thorough cleanliness. He had been much interested in Dr. Harlan's paper, and he did not wish to detract from its value, but he wished to be put on record as believing, from his experience, that surgical treatment, with, perhaps, the slight stimulation afforded by dilute aromatic sulphuric acid, is all that is necessary. Dr. Harlan's discrimination between salivary concretions and the deposits which cause pyorrhea should be emphasized. It is true that pyorrhea is seen in teeth where there is no salivary calculus. We find it sometimes far removed from the salivary ducts, as for instance on the palatal surfaces of upper molars. The point that salivary concretions are not *per se* the cause of pyorrhea should be brought out more emphatically than Dr. Harlan or any of the speakers who have followed have yet done.

Dr. C. N. Peirce, Philadelphia, said that his experience had led him to conclusions directly adverse to those put forth to-night. Where a condition resembling this disease is found in the mouths of children, he does not believe it is pyorrhea; where cases of alleged pyorrhea are claimed to have been cured by purely local treatment, he does not believe the disease is what he should call pyorrhea alveolaris. He has always found in patients suffering from urinary calculus at least two teeth in this condition. This relation has been so constant that it has led him to believe that the pyorrhea is an expression of the same condition that causes the urinary calculus. He has always found calcification of the tubuli of the teeth in connection with the pyorrhea, if it does not precede it. This condition of induration always precedes the active stage of the disease. The observation of this fact has led some to drill into the tooth and devitalize the pulp in the hope of stopping the further progress of the disease, but this operation has always failed. He has never seen a case of what he calls pyorrhea cured. We can keep the teeth, with careful management, five, ten, or fifteen years; he had seen teeth which had been partially thrown out of their sockets by this disease, but which were ground off and wired into place and kept there for six or eight years; but such teeth were always under treatment, aromatic sulphuric acid being used every three months to wash out the pockets.

Dr. M. L. Rhein, New York, thought the keynote to lack of success in the treatment of this disease was lack of knowledge of its etiology. He could bear out Dr. Peirce as to the symptoms observed, but he had drawn other inferences from them. He had seen cases where after constitutional treatment was stopped there had been a recurrence of the pyorrhea. It is an open question whether in such cases the recurrence is due to the dropping off of the constitutional treatment or to the neglect of the patient to keep the mouth clean. He thinks that when we find out about the cause of pyorrhea we will conclude there are different forms of it.

Dr. Geo. L. Field, Detroit. The assertion made by Dr. Harlan and reiterated by Dr. Shepard as to the difference between the deposits in pyorrhea and those of salivary calculus is a point that should be understood more thoroughly. He understood that the peculiar deposit which was thought to cause pyorrhea had never been analyzed. Dr. Harlan said at Detroit that there had never been enough of it obtained at one time to form a basis for a proper analysis. Now, if this is the case, how do these gentlemen know that there is this difference of which they speak. He was free to confess that there was nothing in the range of his professional duties before which he felt so powerless as the disease under discussion. How are we to know where one begins and the other leaves off, in those cases where both deposits are present? He believed that the true pyorrhea deposit was generally described as darker than the deposit of salivary calculus, but outside of this difference in color both seem alike. He would ask if there was anything definitely known which would throw light on the subject.

Dr. Odell would interpose a word of caution. The indiscreet use of so strong a remedy as aromatic sulphuric acid was likely to work a great deal of evil very frequently. He once had a patient to whose teeth he applied this agent very faithfully and finally allowed the patient to use it also. The result was that the two centrals—one of which was a dead tooth, and the other healthy—lost their pericementum. Chloride of zinc is, if possible, a more dangerous remedy when used indiscriminately.

Dr. Peirce explained that, if he had left the impression that he permitted patients to use aromatic sulphuric acid as a mouth-wash, he had made a bad impression, and one that was not intentional. Patients suffering from pyorrhea always craved acid drink, and he had recommended the use of lemonade, as much as was agreeable.

Dr. W. W. Allport, Chicago, had had some favorable experiences with eugenol as an application for alveolar abscess and for exposed or nearly exposed pulps. He had used it with the best results in a case of cutaneous eruption which the physicians had failed to benefit with the ordinary remedies. There is properly a marked distinction between pyorrhea and salivary calculus. In the one constitutional treatment is required in a large majority of, possibly all, cases; in the other mechanical treatment is all that is necessary. We find pyorrhea in some of our most cleanly patients. He could see no reason why it should attack any particular part, unless it is an expression of disease in the system. It is an evidence of breaking down, of which it is the outlet. He had found that in the large majority of cases pyorrhea patients had uric troubles; and when they were put under treatment for these difficulties the pyorrhea was benefited. To talk of curing without constitutional treatment seems folly. In regard to the use of therapeutic agents: we know that eugenol is a powerful germicide—perhaps the most powerful at hand—and that it is also a stimulant. These are the qualities required, and almost anything that will supply them will be useful in these cases. Most of the chlorides will do this. When we use a chloride we have a germicide, a stimulant, and a coagulant. But whatever we use, we should know why we use it; it should be employed for its distinct effect in a certain direction, not because some one else uses it.

Dr. James Truman felt like indorsing Dr. Harlan's views as to the difference in the character of the deposits in pyorrhea and what is known as tartar. There is no more absurd theory than that which ascribes pyorrhea to a deposit of tartar. He had been investigating this disease more or less for fifteen or twenty years—ever since the French writers gave it its name and Magitot announced his remedy for it,—chromic acid. To his mind we don't get at it right. He believed it to be nothing more than a local disease aggravated by systemic conditions; nothing more than an alveolar abscess transferred from the root to the neck of the tooth. The irritation of the pericementum develops pus, which is, as all know, composed of wandering cells, with amœboid movements. What is wanted in the first place is to treat the pericementum; we must first get rid of the germs, and for this purpose we must have drugs. The idea that we must cut and slash to cure pyorrhea is one of the barbarisms of the old dentistry. As to treatment, he agreed with Dr. Harlan so far as he knows the remedies advocated in practice, but he could not see how there could be successful treatment from the use of aromatic sulphuric acid. He has had successful results from the employment of pure sulphuric acid of reduced strength, followed by bicarbonate of soda. He had been in the habit of using and recommending, for these cases, a mouth-wash of thymol, keeping it up all the time. He had also derived good results from the use of sulphate of quinia. It prevents the movements of the leucocytes and thus prevents inflammation.

Adjourned till Wednesday morning, at 9.30 o'clock.

SECOND DAY—*Morning Session.*

After the transaction of the usual routine business, the discussion on "Pyorrhea Alveolaris" was resumed.

Dr. Shepard said that if gentlemen in speaking of remedies would give definite proportions it would add materially to the value of the information they had to impart. He himself had mentioned dilute aromatic sulphuric acid last evening; he should have added, in the proportion of one to three.

Dr. F. Searle, Springfield, Mass., would ask, why use these various remedies which have been mentioned? The answer he supposed would be, because the nature of the disease required it. He thought we had not yet gone quite deep enough into the cause of this disease. If he understands it rightly, it is a disease of the pericementum which is originally set up by some irritant. This irritant may be tartar, it may be a low organism, or it may be mechanical. Whatever is the cause, inflammation is started in the pericementum and works its way down between the alveolus and the pericementum. This has usually been in progress a long time before we know anything of it, and unless we can apply our remedies exactly to the part affected we might as well throw them upon the sidewalk. We know that the trouble which is set up is not pyorrhea until a certain stage is reached, but just when that stage is reached we can hardly tell. Even after a tooth so affected has been extracted, we can scarcely separate the healthy from the diseased pericementum. To effect a cure, all agree that we must remove the deposits thoroughly with delicate instruments, clean out the débris, and let the tissue have a chance to live. After the surgical operation, he dresses the parts as nearly antiseptically as he can. He does not know whether it is a germ disease or not, but he is told that in some cases at least it is. The best dressing, in his experience, is carbolic acid, full strength, applied far down at the seat of the disease. When the dressing is completed we have done all we can do, for the teeth must be used. This dressing coagulates the albumen and forms a protective coating to keep out the organisms and other irritants; it is virtually a Lester dressing. After it is applied let the case alone severely and give nature a chance to cure the disease, though you may possibly examine it in a few days to see if everything has been done properly. Friction is the best means of removing anything that lodges between the gum and the root of the tooth. The patient should be instructed to apply it thoroughly, using the finger to compress the gum and produce friction, then with the brush removing whatever débris remains, and then to rinse the mouth with plenty of water. This statement the speaker said was based on his own experience. He had many cases where he was unable to baffle the disease until he adopted the treatment set forth—carbolic acid, cleanliness, and friction.

Dr. R. Finley Hunt, Washington, D. C., wished to express his thanks to Dr. Harlan for the valuable information he had given, but he thought he had not begun at the right end. If in studying the cause of this disease you follow out the path clearly marked, you will come into the domain of dental hygiene, and thence you enter into general hygiene. The two are synomymous and closely connected. All local diseases are expressions of constitutional conditions. We shall not go far amiss in local diseases if we study constitutional treatment. It seems to him that observation has established the fact that those races who live simply and in accordance with the laws of nature have teeth in better condition than ours are. In studying pyorrhea we have to take into consideration heredity and the habits of living. It is a maxim in medicine that if you remove the cause the effect disappears. Medicine does not cure, but it places the surrounding circumstances in such condition that nature is enabled to rebuild and reform the affected organs. As to the urinary troubles mentioned as found in connection with pyorrhea, his impression is that both are expressions of the same trouble —not that one is the cause of the other. He has found them to be intimately connected.

Dr. Peirce stated that he was sometimes so misunderstood that he often thought it unsafe to open his mouth. The impression he intended to convey was that where you find urinary calculus you find also pyorrhea. He did not say that one was the cause of the other, but that both arose from the same cause, and the presence of one could be used as sustaining the diagnosis of the other. You cannot cure either unless you bring about a change in the condition of the system which causes them. His conviction that pyorrhea is largely due to hereditary tendency is strengthened by the fact that he is so often told by patients suffering from this trouble that their father or mother lost their teeth, though perfectly sound, through their becoming loose in their sockets. He wished to be understood clearly as stating his belief that it is the tendency to the disease which is transmitted—not the disease itself.

Dr. S. C. G. Watkins, Montclair, N. J., thinks the difference in the character of the present discussion on this subject from that of a year ago shows that the year has brought forth fruits; that we are progressing; and that the dental profession are waking up to the necessity of successfully combating this disease. That pyorrhea can be cured he thought was fully proved. As evidence he related a case in which the tooth treated was partially lifted from its socket, and exuding pus nearly all around. There was just a little tartar, which was removed. He also removed the necrosed alveolar border, cutting down to clean, healthy bone, and dressed with aromatic sulphuric acid, applied as far up in the pocket as he could get. The tooth was cut off, dressed to the proper shape, and tied in its place with platinum wire. In one week it was again treated, and was not seen again for three months, at the end of which time it was all well except one small place. He then operated as before,—now three years since,—and the tooth has remained all right, though other teeth in the same mouth have been under treatment for the same trouble.

Dr. W. Storer How now desired to submit a set of instruments designed to aid in the removal of the deposits, and an appliance for conveying medicaments to the diseased tissue, permitting them to be placed just where they are wanted in very small quantities.

Dr. Harlan. One of the gentlemen who have spoken wished to know how to distinguish between salivary and serumal or sanguineous deposits. To the mind of the speaker there is a vast difference in the physical appearance of the two. In the case of salivary deposits it will be observed that the pericementum has not been detached from the roots of the teeth beyond the line of the deposit. Also, salivary deposits are not minute islands, but are continuous, and it will be impossible to lift the pericementum from the tooth beyond the line of the deposit. Whatever may be the exciting cause of pyorrhea, it has its beginning at the gingival margin; the integrity of the dentium ligamentum is destroyed, forming little pockets. Now, if you have a nidus it is easy to see how the deposits will grow. They are not continuous as in the case of salivary deposits, but are broken up into little islands. The micro-organisms with which they are filled manufacture or excrete a soluble ferment, which destroys the tissue in advance of the deposition of the serumal matter. The reason why the remedies named are used is that they destroy the micro-organisms; but they do not destroy the spores, which develop into other organisms, so that after three days it is necessary to again treat the pocket, in order to be sure that the newly hatched-out organisms are eliminated. This is the theory of Dr. G. V. Black. The speaker labored for years under the delusion that ordinarily friction would be sufficient for the cure of pyorrhea, but since he had made a special study of it he had seen the error of that idea. Sometimes when the affected teeth are too loose they must be wired to the other teeth. Dr. Harlan instanced the case of a lady some of whose teeth were so loose that they had to be wired, but in three months from the commencement of treatment she was able to masticate solid food for the first time in three years, and in two months and a half she had gained twenty pounds in weight. He had received letters from dentists claiming that they were unable to get the results he secured, and on investigation he found they had neither the remedies nor the instruments. How can gentlemen hope to succeed when they don't try honestly. It is no criticism when gentlemen find fault with a method of treatment which they have not tested faithfully.

Dr. E. Parmly Brown, Flushing, L. I., thought that the intermediate ground between those who can and those who cannot cure pyorrhea was the safest. What blame attaches to the physician if a sore throat which he has cured reappears in a year or two? Why, then, should the dentist be blamed if a case of pyorrhea which he has cured reappears in three or four years? The speaker was of opinion that this disease could not be eradicated except by generations of treatment; it is in the blood.

Dr. Shepard thought it was possible to wipe out pyorrhea in the first generation. We should all keep in mind what seems to be a fact, that whatever is the cause of this disease it is possible for the dentist to prevent its appearance in the children of those who are afflicted. If taken in the early stages there will be no loss of the alveolar process, no inflammation of the tissues, and such a degree of health will be secured that the teeth will be retained through a long life. That at least was the belief he had gathered from his experience in families having a tendency to this disease where the patients came into his hands in early life. Our hope lies in spreading this knowledge so as to induce parents to bring their children to us in early life; and our strongest efforts must be devoted to them in order to prevent the development of the conditions we so often see in later life, when their troubles are only amenable to a partial amelioration. As Dr. Peirce has said, it is only the tendency which is inherited, and when this is combated early in the proper manner no injury is to be feared. Terms have been used so loosely by some of the speakers that it might be inferred that they don't know what pyorrhea is. One gentleman spoke of finding no pyorrhea on the teeth. The word "pyorrhea" only describes one symptom; it is derived from the Greek and means "pus-flowing;" but it is frequently made to include the loss of tissue and other symptoms of the disease under discussion. This confusion was partly excusable, because among the many names that have been suggested, no one expressed all the symptoms, but it should be a part of the functions of the Section on Nomenclature to introduce and insist on the proper use of terms in discussion.

Dr. Atkinson. In this discussion gentlemen have been claiming to classify diseases in the plural before they defined disease in the singular. Let us first find out what this disease is, and whether it can be limited or is not to be limited. Every phlegmonous abscess is self-limiting and self-curing, if not interfered with. If you have a boil or other abscess near a bone, cartilage or tendon, it will head towards the soft tissues, because there is the least resistance in this direction. Very often nature aborts an abscess by retrogression and absorption. When the boil bursts and its "core," as it is called, comes out, the boil cures itself spontaneously. That is curing by suppuration. An alveolar abscess doesn't cure itself because it is open and microbes in the saliva and in the air get in and set up fermentation and putrefaction. We fail to cure pyorrhea because our operations are not thoroughly done, and we leave portions of the inflammatory material, which again sets up the trouble. In good constitutions encystment may occur, and then the cure is permanent. When you have removed the cause of a disease the organism cures itself. He wished all could get rid of the idea of the specificity of any method of operation. What is wanted is to so treat the case that the tissues will have freedom to appropriate the pabulum they need. His pet remedy to keep out bacteria is a saturate solution of salicylic acid in alcohol, which forms a pellicle protecting the tissues. The teeth afford a very favorable territory for the study of the laws of the organism. In the enamel we have a representative of the mineral kindom, in the dentine the vegetable, and in the pulp the animal.

The subject was passed.

(To be continued.)

At the annual election, held Friday morning, August 8, 1884, the following officers were elected for the ensuing year: J. N. Crouse, Chicago, president; M. Whilldin Foster, Baltimore, first vice-president; C. F. Rich, Saratoga, N. Y., second vice-president; George H. Cushing, Chicago, recording secretary; A. W. Harlan, Chicago, corresponding secretary; George W. Keely, Oxford, Ohio, treasurer; A. O. Hunt, Iowa City, Iowa, L. D. Shepard, Boston, C. N. Peirce, Philadelphia, members of the executive committee.

The newly-elected president appointed as members of the Publication Committee, of which the secretary is *ex-officio* chairman, A. W. Harlan and E. T. Darby; as local Committee of Arrangements, A. T. Smith, Minneapolis, Frank H. Gardiner, Chicago, and H. J. McKellops, St. Louis.

Minneapolis was selected as the next place of meeting.

NEW YORK ODONTOLOGICAL SOCIETY.

The New York Odontological Society held a regular meeting at the house of Dr. E. A. Bogue, No. 29 East Twentieth street, June 17, 1884.

The president, Dr. William Jarvie, in the chair.

Incidents of Office Practice.

Dr. Ives. I have a case of pyorrhea alveolaris to report. I must confess that it is a disease in the successful treatment of which I have been an unbeliever; feeling very much as I heard Dr. Rich express himself at Albany two years ago, that, if I could watch a case from the beginning, see it through all its phases, and see it cured, I would be converted. The patient in question was a gentleman about thirty years of age. The teeth involved were the right superior central and lateral and the left superior first and second molars. The pockets were very deep, extending to the ends of the roots, and the teeth somewhat elongated. The treatment was very much the same as that recommended by Dr. Bödecker,—iodo-chloride of zinc to remove the local inflammation; then the removal, as far as possible, of all accumulations, and then the injection of tartrate of chinoline. This was preceded by the peroxide of hydrogen, which I consider a great cleanser, and I don't know that it is anything more. The case has been under treatment just three months. I saw it to-day. The teeth are perfectly tight, the pockets are closed to within one-sixteenth of an inch, and the case is nearly ready to be dismissed. Do I think the cure a permanent one? I must say candidly that I do not. I do not think any local treatment will entirely cure what is largely due to systemic causes, and, until we can find constitutional remedies to aid us, I have little faith in the permanency of the cure. In this case I certainly shall expect a recurrence of the trouble. The point of interest is the short time that has been required to produce this result. So far I feel very much encouraged in regard to it. I want to call your attention to a little instrument that has vastly aided me in the treatment of this case. It is simply a *perfect syringe*, and the only perfect syringe that I ever saw in my life. Its peculiarity is its perfect simplicity. The caps screw directly to the glass barrel. The point, made of platinum and iridium, is of very fine bore, and is possessed of great strength and rigidity, enabling one to go freely under the gums to the ends of the roots. Its chief merit is that the piston, which is made of hard rubber, is ground to fit the barrel perfectly; and then, being turned into a cone shape and coming up to a very fine edge, it allows more or less elasticity. I have used this syringe for four months, and have never seen a suspicion of any moisture back of the piston. It was made for me by Reynders & Co. Those who have been annoyed with syringes which allow moisture to escape at the back will find this one a great boon.

Dr. Howe. I saw this case of Dr. Ives's. The opening between the lateral and central incisor, where there had been no gum and no alveolar process, was filled with gum-tissue up to within, I should think, one-sixteenth of an inch of the level of the other gum, where the pocket did not exist. I had a case of this same disease,—a right superior second molar, which stood alone, with no molar in front nor back of it, and which was exposed to pretty severe use. The gum became separated from the root of this tooth so that I could introduce a probe under it and between the bifurcation half way to the root apex. The soreness of the tooth led the gentleman to seek my advice. After about ten or eleven weeks of treatment with tartrate of chinoline, applied twice a week, the gum healed up, adhering to the tooth so that I could not introduce a probe. This was accomplished between three and four months ago. I saw the gentleman this week, and the gum remains in as good condition as it was at that time. In this case there was no effort to scrape the alveolar borders,—a fact which I would make specially emphatic. The use of instruments was limited to removing granules of calculus at one sitting.

Dr. Kingsley. I was absent from the meeting of this society two months since, and was thus prevented from listening to Dr. Dodge's paper. I was very sorry at the time, but I contented myself with the reflection that I should be able to read it in print. I have had the privilege of seeing the proofs of his paper, which have been in my hands for a few days, and I have been reflecting upon the subject. I shall take this opportunity to make some comments. The paper is entitled "The Spheroidal Tendency of Amalgam," and from it I shall read a few brief extracts:

"The fact is that fillings of amalgam frequently change their shape after they have become solid. The theoretical explanation is that they do this because the amalgam tends to become a sphere. * * * I do not at all present myself as asserting its truth. There are serious objections to believing that the molecules of so solid a mass as amalgam are subject to the law of readjustment by mutual attraction which draws liquids into the spherical form * * * The student of nature's orderly ways becomes very incredulous of 'mare's-nests,' and asks unusual strength of proof for unparalleled phenomena."

In the discussion which followed Dr. Dodge's paper Dr. Bogue expressed himself in this form: "Gentlemen talk about amalgams as though they were all comprised under one head; but they are far from it." He also said: "You have good, bad, and indifferent. The term amalgam is used as though it indicated a single substance, the properties of which were well understood."

I presume the experience of every one is like that of Dr. Bogue; there are good, bad, and indifferent. Let us take one which we believe to be a good amalgam, and see if it will stand a test which would involve the truth or falsity of the theory advanced by Dr. Dodge. To describe that theory in brief, it might be stated that a mass of amalgam, in assuming a spherical form, would be likely to bulge in its shorter diameter and contract in its longer one. It seems to me that we can readily put that theory to test and determine this question by making the ordinary test of amalgam,—putting it into glass tubes with a liquid. I have here a number of amalgam plugs pressed into glass tubes, with clear alcohol on one side of the plug and colored alcohol on the other. These tubes are of various diameters and shapes; some of them are round, some of them are triangular, and some are oblong. In the one which I hold in my hand the long diameter of the plug, or of the tube, I judge to be nearly three times as great as the short diameter. There are several of these tubes of this description. In some of them the amalgam plugs are about one-thirty-second of an inch in thickness, and others are thicker. One that I hold in my hand is fully half an inch in thickness, in the same diameter of tube. It strikes me that here is a capital opportunity for proving whether the theory advanced by Dr. Dodge in reference to this particular amalgam is correct or not. The theory may be correct in its application to some kinds of amalgam, that I don't know anything about, but it certainly does not apply to the amalgam here used. If there is any amalgam which will stand the test of this latest theory, I think we may safely pronounce it, if not the best, certainly one of the best in use. None of the plugs in these glass tubes, in a single instance, so far as I can discern, show the slightest trace of crawling at the edges, or rounding, or assuming a spherical form, or shortening the long diameter.

President Jarvie. How long have they been in the tubes?

Dr. Kingsley. For several weeks. These were not prepared expressly for this purpose. They had been prepared, most of them, for two or three months, by Dr. Oliver, who had brought them to me a number of weeks ago; and when this matter came up I called for them again, in order to re-examine them and see whether I could detect any evidence of shrinkage, or tendency to form a sphere, as described by Dr. Dodge; so that, so far as the time is concerned, it has been sufficient for any shrinkage or assumption of a spherical form to be indicated, if it would occur at all. We do not have to wait as long as that to find out whether an amalgam filling in a tooth is faulty, if that fault is shrinkage. I believe this particular amalgam does not shrink and does not assume a spherical form, whatever some other amalgams may do. It does not change its shape at all.

Dr. Clowes. I feel obliged to Dr. Kingsley for speaking of amalgam, and thank him for the pains he has taken in its behalf. As to the value of his experiments, I am not prepared to decide, but have hitherto considered all professional operations upon phials, of whatever form or with whatever material, as of little consequence, and a waste of time and talents. My personal labors have been devoted to the filling of dental cavities, and I regard them as the only legitimate field for intelligent action. Long experience has taught me that a good amalgam makes a tight-fitting filling, and as that quality commends itself to all tooth-savers, they should have a high respect for it. Looking back upon the track of professional advancement, no subject in our science has been more prominent than amalgam. For half a century it has run the gauntlet of inimical criticism. No name has been too opprobrious to call it, no quality too vile to assign to it —and yet it lives. It has long seemed to me marvelous that a thing so humble should have withstood successfully the onslaught of a thousand foes and triumphed gloriously. Its invincibility consists in the fact of a special Providence—and such I declare it. If we view it in this light, more care will be taken in its composition, preparation, and employment. I further declare that no one can properly use amalgam who has not first learned to skillfully manipulate gold. It is painfully apparent to me that there are many in my profession who look upon amalgam as a material requiring no skill in its application. So long as this impression remains they will continue to perpetrate the miserable failures which are seen in their practice. A man at the West has discovered a vaporish disposition in amalgam, and more recently an ingenious theorist has invested it with spheroidal tendencies. The one presents a clear case of mental inversion, while the other pats lovingly the thing he chides, not dreaming, if his theories were facts, that the grandest hope of our profession would perish. The tendencies of amalgam are wholly conservative, and its possibilities for good are beyond belief. In the "pin-head" cavity, as in the yawning cave, in the restoration of a tooth partly lost as in the full embodiment of a substitute crown, it does its noble work. Had it pleased nature, by her constructive force, to elaborate the teeth from amalgam constituents, the word "dentist" would have been unknown and our profession a non-existent class; for her work would have been imperishable. She did not so ordain, but permits us to be and enjoy this saving grace.

Dr. A. H. Brockway. I would like to ask Dr. Clowes if he can explain the appearance of such fillings as Dr. Dodge speaks of on any other theory than that of the spheroidal tendency of the material in hardening. Will he tell us why most amalgam fillings crawl away, so to speak, from the edges of the cavity? I should like to have from one of his experience and observation some satisfactory explanation of this troublesome feature.

Dr. Clowes. In my use of amalgam I do not see it. With me it is an unknown circumstance. I attribute imperfections in amalgam fillings, as I do in gold ones, mainly to careless manipulation, and I regret to say that good work with either is still a limited quantity. The purest gold and the best amalgam will fail if the ability to use them be lacking. Only a few days since I saw some of the most shameless amalgam fillings, which had been inserted by one of the nicest men in the profession. The material was good, but the fillings were odious. It is now about time that the how rightly to use amalgam should be sought for. On this point the education of dentists has been sadly neglected.

Dr. Dodge. It looks as though I lay under the suspicion of having attacked the use of amalgam. To begin with Dr. Kingsley's specimens, there is not so good a one among them, as far as I have examined, as those which every pedlar of amalgam that comes into your office will take out and show you. They are merely a wafer of amalgam put in the bottom of a little phial, perhaps half an inch in diameter, and may be a line or two lines in thickness, with some coloring matter over it, and you are invited to see that this coloring matter has not gone through between the amalgam and the walls of the glass. If that amalgam had any tendency to become spheroidal, that is precisely the sort of form that would show it, for it would tend to draw away from the walls of the glass and bulge in the middle. I have not observed one of these that offers any better demonstration of the fact that amalgam does not change shape in a bottle than I have seen over and over again in my office in the hands of men who were soliciting me to buy their particular amalgam. So, I do not think Dr. Oliver's specimens throw any light upon the question. In the next place, I believe there will not be found a word in my paper—I know there was not one in my mind when I wrote it—to indicate that I supposed myself to be giving the profession a means of escaping from a harassing difficulty. I use amalgam every day, I suppose,—I have to-day,—and I find it stays where I put it. I think it is practically free from any spheroidal tendency, or any shrinkage of any kind; and I believe, with Dr. Clowes, that there is a great deal in working it rightly. I find my fillings are satisfactory. Nevertheless, I do not see how anybody can deny that we frequently see amalgam fillings, from whosesoever hands they come, that have bulged out of the cavities they were put in; and we see that other fillings have dropped out of the cavities they were put in. It struck me, in thinking the thing over, that I saw an explanation of this. When I first began to think about writing this paper I went to Mr. Williams to make inquiry as to what was the worst amalgam ever known,—the one that was accused of shrinking the most,—for I wanted to get some of that and subject it to tests. I know the amalgam that I use, and that other gentlemen of my acquaintance use, don't do that. I don't know but there are a dozen or two dozen good amalgams in the market, that would not show a change of form; or, if there is any change, it is not enough to be perceptible or do any harm. I suppose, if you took a piece a foot square, it might, but I did not feel like affording that experiment. I could not find a dealer in dental materials who had any recollection of a poor amalgam. I don't suppose it is policy for them to remember that an amalgam is poor, because every amalgam has its interested friends. However, I did not succeed in finding what was known as a poor amalgam; so I presented the matter simply as a theoretical view, which seems to be sustained by certain facts observed in practice. If it has been supposed that, on the one hand, I was attacking the use of amalgam, or, on the other, that I supposed that every dentist needed to begin right off with the most careful observance of those things, the supposition does me injustice, and is not supported by anything that will be found in my paper when the gentlemen have it before them. It was with me something like the minister in the pulpit discussing the curious phases of iniquity. He is not wicked, and he knows nobody in his congregation is wicked, but he speaks of what may exist in some other place,—perhaps in the next town. It is merely the curious phases of iniquity, and he discusses the matter from that stand-point, as I do this.

Dr. Kingsley. I am reminded of the old story of the question put to the king as to why the pail full of water should not run over when a fish was put in it. It seems to be generally assumed that amalgam fillings bulge.

Dr. Dodge. Some.

Dr. Kingsley. Yes, some amalgam fillings bulge.

Dr. Brockway. And budge, too.

Dr. Kingsley. Yes, and budge, too. But, as near as I can find out, the fillings that bulge and budge are not the fillings that you yourself have put in; they are the fillings that come from some other hands; and how do you know but that they were put in bulging in the start? How do you know the condition of that filling when it left the hands of the man who put it into the tooth; how do you know it was not then in the same shape that you now find it? In most cases, where I have seen anything that looks like amalgam shrinkage, or a crawling away at the edges of the cavity, I believe there was evidence of the crumbling away of the edge ot the cavity, showing that the cavity had not been as carefully prepared to receive the amalgam filling as it would have been prepared if it had been going to receive mallet blows sufficient to make gold well adapted to those edges. The idea seems to have possessed the operator that, as he was going to use a very soft material, he could leave the edges of the cavity thin and overhanging, expecting probably that the filling would support and sustain the enamel; but such conditions will nearly always end in the crumbling away of the edges. But I believe that every one who uses a good amalgam, and uses it properly, will not find, in any length of time, his own fillings bulging; the fillings that bulge will be somebody else's.

Dr. Dodge. I have a filling of my own that bulged. It never was in anybody's mouth. I found it in a drawer among others that I had filled for the purpose of trying the manipulative qualities of a new amalgam. When I took up the subject of this paper I went to see what they were. I found one filling in the approximal surface of a molar, considerably decayed, which had been filed away freely, leaving thick walls. I had filled that with amalgam and filed it off after it became hard, so as to be flush with the surface, and a good surface was given to it. It had then been thrown into a drawer, and it may have been there two or three years. It stands out now so that you could take a file and file off considerable before you would touch the tooth. I do not know what amalgam it was, or whether I mixed it soft or hard. I have another specimen that was preserved because the amalgam filling had saved the tooth perfectly for ten years, the tooth being extracted on account of alveolar disease. That has bulged. It supports the theory of the paper beautifully, because it was a long, narrow filling, and it has bulged the narrow way. It came out a little from the surface and bulged against the walls the other way, and so was fastened immovably.

Dr. Brockway. The explanations of Drs. Kingsley and Clowes do not satisfy me. I do not claim that all amalgam fillings *bulge*, although I have seen some cases where it was very noticeable; but I have never yet seen an amalgam filling from any man's hands, unless made of copper or palladium, that did not, after a few months' wear, present the appearance of having somewhat changed its form. I mean that there was a perceptible crevice between the filling and the edge of the cavity. In most cases, it is true, this is so slight as not to seriously impair the usefulness of the filling,—owing, perhaps, to the antiseptic property or some other quality of the material; but where the crevice is of considerable width, as I have seen it, even in fillings from the hands of excellent operators, it is a source of great danger. If some one could point out a way to entirely obviate this trouble in the amalgams generally used, we would, I am sure, be greatly benefited.

Dr. Francis. The interest I took in Dr. Dodge's paper induced me to examine carefully such amalgam fillings as have come to my observation since the paper was read. I was looking at some the other day in the mouth of a physician, which he informed me were introduced several years ago. A number were in the grinding surfaces of molars, and they presented just the appearance described by Dr. Dodge. I have taken out a number of amalgam fillings for other patients within a few weeks to replace with gold, and found them in a similar condition. In regard to Dr. Clowes's statement that "too much mercury is used," I recollect hearing him once state that, in order to have good, strong amalgam fillings, plenty of mercury must be used. Dr. Bogue asked at the time how mercury could make amalgam fillings strong.

Dr. Clowes. Some use too much mercury; others too little. Hence the "balling up," the flattening out, the edge-crumbling. But do not be afraid of mercury. Were it not for that there would be no amalgam. Learn to understand it, to prepare it, to employ it; then a careful practice will do the rest.

President Jarvie. Permit me to relate a case that came into my office, and my mode of overcoming a condition which frequently necessitates the loss of a valuable tooth. A superior second molar had been split through the center to the bifurcation of the roots. In all my experience I have never been successful in holding the split portions together for any great length of time where any force was brought to bear upon the tooth, and in this case the occluding teeth were the second lower molar and the wisdom tooth, the only occluding teeth on that side of the mouth posterior to the first bicuspid. The sides of the tooth were brought together by Dr. Parker. A gold crown was swaged and forced over the tooth, the pulp being first removed and the roots filled; and the tooth is held together in that way. I do not know whether any one else has treated such a case in the same manner. If they have I have not heard of it; but it seems to me to be the very best way of treating a split bicuspid or molar, for it is utterly impossible for any movement of the two parts to take place.

Dr. W. A. Bronson then read the following paper, entitled

"CYLINDER FILLINGS."

The manufacture of gold foil for dental use has, within a few years, reached so great a degree of perfection that its manipulation, in almost any of its forms, can be accomplished with a very moderate degree of skill, through the use of various methods. Four such forms may be said to constitute the principal shapes in which gold is manipulated previous to its introduction into a cavity, viz., the pellet, the rope, the ribbon, and the cylinder.

It is not questioned that in any of these forms gold can be efficiently used. The fact is proved by the thousands of fillings, inserted by the use of each and all of these forms, which have retained their beauty and their saving virtues for scores of years. Neither will we venture to assert that any one of these forms is best for all cases and for all operators. Almost every operator—perhaps as often by accident as otherwise—falls into a method and the use of a form of gold which becomes to him the best method and form, but which to his neighbor might be the least desirable and efficient.

It will be remembered that at a recent meeting of this society the use of gold in the form of cylinders was criticised and condemned. The best way, perhaps, to refute this attack on the use of cylinders is to set forth their claims to efficiency, based upon their detailed merits, and to allow the beauty and durability of work properly done with them to furnish the special pleading in the case.

Upon examining the four forms of gold above named, with a view to comparison of their merits, it would seem that the pellet, which, perhaps, is in the widest use, has the least practical value. It is easily made, by simply rolling a piece of foil into globular shape, thus producing a promiscuous massing of the metal, with the thickest portion of the mass in the center and a gradual thinning to the circumference. This would seem an efficient bar to general uniformity in condensation.

The rope, a favorite form with many of the best operators, presents some of the bad features of the pellet, in so far as it is made up by a similar promiscuous massing of the metal,—which, however, thins off towards only two sides of its body,—and this fact, together with its generally smaller bulk, renders it capable of being more accurately placed and condensed than the pellet.

Next is the ribbon, admitting in the hands of a skillful operator of being placed and condensed in successive parallel surfaces—the most homogeneous and sensible way in which foil can be packed. We have seen that the irregularities in the occluding surfaces of foil in pellets and ropes, and their varying thicknesses in different portions of their masses, are objections entirely obviated in the ribbon, which is an aggregation of plane surfaces, flatly presented to each other, and requiring simply to have the air pressed from between them to secure absolute occlusion and (if the foil be cohesive) perfect cohesion throughout the filling. Without this condition of absolute occlusion of the foil surfaces, it is evident that any form of gold, while it may occasionally be efficient, cannot be certainly relied upon to produce the best and most uniform results.

How far, then, can the cylinder be said to possess this necessary condition?

For several years gold cylinders have been sold in the depots, made by laying together several sheets of foil, rolling them, and then cutting to the desired lengths. In this way a valuable cylinder is obtained,—one answering all the ordinary purposes of cylinder filling, but lacking toughness; when it is desired to fold one end over the margin of a cavity, it is too apt to break or cut at the bend.

For the sake of illustration, what is meant by a typical cylinder may be thus described: Cut a sheet of foil into four equal parts; fold one of these parts lengthwise upon itself three times; then catch one end of the ribbon thus formed in a small fork and roll it over the fork to the desired size. If a larger cylinder is needed, use a third or a half sheet of foil in the same way. In this manner a cylinder is obtained accurate in construction, compact but not hard, and one which will not break in manipulation. The principal objection to this method is the loss of time and the labor imposed on the operator; and, when this tax becomes too heavy, the cylinder of the depot must be substituted (and with these a vast gain is obtained over any other form).

In illustration of the way in which the cylinder is used: If a properly constructed cavity is supposed in the grinding surface of a molar, a cylinder of suitable size and length should be placed at some point where it can be secured, fastened, and impacted. Against this, and lapping the wall of the cavity, another should be placed and condensed, and so in succession through the whole operation. A finish may be made either with small cylinders or with cohesive gold anchored in the soft gold.

The use of cylinders supposes them to be of such length as to reach from the bottom of a cavity to such length above or out of it as to turn over—be held—and be compacted firmly against the margins. It is believed that in no other way can such good security be obtained with so little danger of fracture.

Another example of the use of gold in this form is in the filling of approximal cavities. With an instrument of proper thinness and width the gold can be carried to the cervical margin, and as the free end should project a little out of the cavity, it can be carefully folded over the margin, and, as it is also supposed to wedge between the teeth, can be firmly condensed in its place. Each successive cylinder, as the filling is built down the cavity, can in like manner be made to cover the lateral margins, and so, not only can a thoroughly compacted filling be made, but also a contoured one, without the use of cohesive gold.

One other example, of not less importance than either of the two mentioned, is the filling of cavities on the labial and buccal faces of the teeth, cervical or otherwise. A cylinder placed upon the cervical wall of a cavity of this kind, and securely fastened, makes a starting point not to be equalled in any other way.

The examples which have been given illustrate only the ordinary use of the cylinder.

There is another class of cases in which it is nearly indispensable, —forming a base, or foundation, which no other form can be made to do as well. It is sometimes the case that an approximal decay will extend, not only below the cervex of the tooth, but also entirely across the approximal surface, and in the bicuspids and molars especially, forming cavities, deep, broad, and inaccessible. To start a filling in a cavity so located taxes the highest skill. It cannot be done with the rope or the ribbon, for the reason that a sufficient mass of gold cannot be carried in these forms to make a firm lodgment; and the pellet will not do, for tne reason that the very nature of its shape makes it impossible to adapt it to the place. But a cylinder, properly constructed in thickness and length, can be carried to the place and firmly wedged; and the very nature of its shape makes it possible to anchor and condense it more securely than by any other method. It may be necessary in some cases to use an entire sheet of No. 4 in one cylinder, and the fact that all the surfaces are parallel to begin with makes the condensation reasonably secure.

Still another instance may be mentioned, in which the peculiar form of the cylinder renders it capable of accomplishing an end impossible for either the ribbon or pellet, and not nearly so well or so easily attained with the rope. Imagining a grinding-surface or other cavity having four strong and parallel-sided walls, cylinders of a length sufficient to project somewhat beyond the proposed surface of the filling may be set in and compacted until the cavity is full, and the projecting ends may then, by successive packings and burnishings, be condensed down to the desired level and surface, leaving the surface almost as hard as though cohesive gold had been used for finishing, and with no danger that the sharp-edged margins shall have been beaten or defaced.

Another consideration of great value in favor of the cylinder is the small comparative time used for a given operation. Very large masses of gold being capable of efficient use, the cavity is quickly as well as properly filled, with the advantage of but small expense of time and labor to the operator, and without prolonged discomfort to the patient.

Finally, the chief excellences of the cylinder may be enumerated as the parallel surfaces of its mass, its peculiarity of shape, and its uniformity of thickness. The parallel surfaces render condensation most easily, thoroughly, and certainly accomplished; the shape, that the body of the filling (in a properly-formed cavity) shall be homogeneous,—of equal density all through,—that larger masses of gold may be more safely used than by any other methods of preparation of foil, and that the margins of cavities shall be safer; the uniform thickness, reaching out of the cavity, materially aids in effecting the security of the margins; and, lastly, it would seem that in general better results may be obtained, in the briefest time and with the least labor on the part of the operator and of discomfort on the part of the patient, with cylinders than with any other form of gold.

Dr. Bogue. I ask the president's permission to withdraw the demonstration that I had intended to make, simply because of the lateness of the hour and the numbers present who cannot possibly get around the chair. I have here two plugs made in a steel plate,—made in the same hole in a steel plate,—one having been made of Dr. Atkinson's favorite heavy No. 120 foil, and the other having been made of cylinders. The No. 120 foil filling took just one hour and ten minutes to put in place, and the other one took just twelve minutes to put in place. That they are equally weighty, I should never think of claiming. That the cylinder filling would protect the walls of the cavity in a tooth from decay better than the one that took an hour and ten minutes, I steadfastly believe; because, by the process of wedging which it is necessary to adopt in such operations as that, the flat laminæ are driven against the walls of the cavity with greater accuracy than heavy foil can possibly be, if crumpled in inserting. If gold in the form of cylinders or mats is inserted into a properly-shaped cavity, so that in finishing the filling the edges of gold are exposed, just as the edges of paper are in finishing the leaves of a book, there can be no flaking or pitting; whether the foil be what is called soft, or whether it be cohesive, the whole depth of gold will not come away. So, when it is possible to adopt that form, it is in every way an advantage and an economy.

On account of the lateness of the hour, further discussion of Dr. Bronson's paper was deferred.

Adjourned.

E. T. Payne, *Recording Secretary.*

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The First District Dental Society of the State of New York held a regular meeting on Tuesday, May 6, 1884.

The president, Dr. A. L. Northrop, in the chair.

Dr. M. L. Rhein read a paper on "Oral Hygiene." He said: During a discussion of this subject before the Odontological Society, last October, one of the members said, "Everybody knows more or less about brushing the teeth; every person understands it; it is an established thing, like washing one's face and brushing one's hair." My experience is that, however well established may be the practice, everybody knows *less* about brushing the teeth correctly and *more* about brushing them improperly. Upon making a careful examination of the brushes retailed in the largest stores in New York City, I was surprised at the ignorance displayed by the general public in their choice of tooth-brushes. Wherever I asked what was the most popular brush, I was shown those of huge dimensions. A cross motion is the only one that can be made with a brush of such magnitude, and, to quote from Dr. Abbott on this subject, "the consequence is that the gums are irritated and recede; the necks of the teeth become cut or grooved, and sometimes even the enamel is brushed off. Besides, when the brush gets half way back in the mouth, its excessive size prevents it from going further, and the back molars are not touched at all."

The first thing, then, is to prescribe a suitable brush for our patients, and then instruct them how to use it. It should be passed in every direction, across the grinding surfaces or crowns of the teeth, to insure the bristles reaching every depressed surface or fissure, and upon the inside and outside of the arches, in the direction of the length of the teeth, from the gum towards their cutting edges, by slightly turning the hand upon the wrist; behind the wisdom teeth and on the inner surfaces of all the teeth. The brushing should never be severe,—only enough to remove the effete material of a few hours' standing. The dentifrice used should be of the finest quality, so as to produce the least possible amount of friction. The time to brush the teeth is after every meal and before retiring, so as to always leave clean and polished surfaces. To remove what remains between the teeth after the brushing, nothing surpasses the waxed dental floss, and occasionally a little powder can be carried on it between the teeth.

For a long time I sought in vain for a tooth-brush that came up to my ideas. My friend, Dr. T. J. Thomas, of Paris, showed me a brush he had been recommending. It suited me better than any other I had found, and I concluded that with certain modifications it could be made a model tooth-brush—one that would reach every exposed portion of the teeth, in small mouths as well as large ones; that would accomplish its work as automatically as possible; and be so constructed as to prevent the patient's passing it across the teeth. The brush which has been constructed on these ideas is made on a slab of bone, curved, with the bristles on the concave side; the bristles in three rows, running in parallel lines to the end of the brush; widely separated, and trimmed to different lengths. The brush has a decided taper, so that, while the bone next to the handle is a half-inch wide, at the apex it is less than a quarter of an inch in width, and the bristles at the apex are not more than one-eighth of an inch wide. After passing the center of the brush the bristles commence to rise in height, and at the apex there are three converging rows of bristles, forming one narrow tuft. On the original lot of brushes, and on every brush that I have seen, the bristles are set back some distance from the end of the brush. The distal portion of the handle terminates close to the bristles, the apex at the back being bevelled off so that the brush passes with the greatest ease around all portions of the wisdom teeth, even in the smallest mouths.

Dr. W. H. Atkinson. I have been using the brush described by Dr. Rhein, and am better satisfied with it than with any other brush I have ever seen. I would suggest that the brush be shortened somewhat, and its heel be made somewhat narrower.

Dr. E. Parmly Brown. I have lately been using both Dr. Rhein's and Dr. Watkins's tooth-brushes. I am more in favor of Dr. Watkins's brush; but either is the best I ever tried.

Dr. Bödecker. I can also testify to the value of Dr. Rhein's brush. I think it the most effective I have ever used.

Dr. Odell. It has been said that the improper use of the brush, in rubbing it horizontally across the faces of the teeth, never causes recession of the gums. I have seen many cases in which the prominent parts of the gum, naturally in the way of the brush, were entirely gone, while that between the teeth was good and sound. I have seen the entire faces of the incisors so scrubbed away that it would be impossible to put rubber-dam over them without its leaking, except by using some other preventive. A case came into my hands such as I have described, where the patient was using rottenstone as a dentifrice, and had been using the brush in this way for years. I attacked him about seven or eight years since on the improper manner of brushing his teeth, and, as soon as he changed his tactics in regard to the use of the brush, his gums ceased to recede, and the spongy appearance which they presented at the apex of the gums has disappeared. As one gentleman here expresses it, he now brushes the gums on to the teeth instead of brushing them off.

Dr. Meigs. There are two sides to almost every question. When I came to this city, in 1866, I was introduced to a physician—an old bachelor, seventy years old—whose father was a dentist in Vermont many years ago. The old man had a very elegant set of teeth for a man of his years, and I complimented him on the fact. He told me that he had an original tooth-powder, and intimated that if I would not tell anybody about it he would tell me what it was. He went to a box and took out an old red brick and a case-knife, and showed me how he used to scrape it off and clean his teeth; and he had done it for forty years. I looked over his mouth carefully to see if there was any destruction done, and there was not a particle. He had the nicest set of teeth for a man seventy-two years of age that I ever saw. When I went home I made up my mind that, if brickdust was a pretty good tooth-cleaner, pumice-stone might be also; and I have used pumice-stone in my own mouth for a good many years, about once a week or once a month.

Dr. Dwinelle. I do not believe for one moment that brushing the teeth laterally or horizontally has the effect which is generally ascribed to it. I am not satisfied with the illustrations that have been brought up to corroborate the theory. We all know that the teeth at the cervical portions are very apt (in some mouths) to be absorbed away; their lines are broken, and in place of a straight line there are ridges, grooves, cavities, and ragged edges. The mystery is as to what has probably been the cause of that condition. I trace it to constitutional causes. Teeth will become cut out in that manner; but I do not believe brushing has anything to do with it. We know that in some mysterious way the destruction of the teeth may be going on in a certain direction for years, and suddenly the constitution changes, the objectionable influences cease to act, and the destruction is arrested. Nature corrects the difficulty and arrests the destruction. I think it is quite proper for us to use a lateral motion or a cross motion in cleaning the teeth, or to use anything that will clean the teeth without violence,—not even so much violence as my friend's brickdust might cause, or even his pumice-stone. I should be afraid to use them myself; still I have known people who used pumice-stone all their lives and yet had good teeth.

Dr. Odell. Dr. Meigs spoke about a dentifrice, and not about the method of applying that dentifrice. We do not know whether he brushes the teeth lengthwise, or crosswise, or with a revolving motion.

Dr. Meigs. I have for several years instructed my patients to clean their teeth according to the regulation method, brushing the upper teeth down and the lower teeth up. I have also said that you cannot clean the left side of your mouth with the right hand as well as you can by holding the brush with the left hand. It is quite as easy and more efficient to take the brush in the left hand and clean the left side of the mouth. That is a very important subject upon which to instruct children.

Dr. Rhein. Teeth should be cleansed with the least possible amount of force. The concavity of the brush should fit the contour of the arch, and by an up-and-down movement the long bristles will pass very readily between the teeth as far as they can possibly reach, while the shorter ones at the same time brush the outer sides of the teeth. I have had pointed out to me by a great many old practitioners this cutting away of the enamel caused by cross-brushing the teeth.

Dr. Hodson. I am inclined to think that cross-brushing, with a hard, strong brush, and the unwise scrubbing that our patients sometimes tell us they have been giving their teeth, and the use of tooth-powder, undoubtedly cuts away teeth at the necks to some extent. But I have seen mouths in which this method of brushing did not seem to account for the destruction of the teeth shown there, particularly on the front teeth. The case of one of my patients occurs to me at this moment that entirely wipes out this supposition. It is the loss of the substance of nearly the whole of the front teeth —not a longitudinal loss, but a cross furrowing; and I know he brushes his teeth longitudinally. The cross-cutting is enlarging continually, in spite of all efforts to stop it, and is larger in two front teeth that set inside the others; two teeth that set outside are perfectly good.

Dr. Dwinelle. I have seen just such illustrations. I occasionally have patients—you would hardly believe it, gentlemen, in this enlightened age—who tell me they have never used a tooth-brush; but you would believe it if you were to look into their mouths. I am satisfied they never used a tooth-brush, and yet I find in their teeth this same waste, these same abrasions, and this same absorption. We do not understand the thing, and the man that does ought to be anointed, for we have been plodding and inquiring ever since dentistry existed to find out why the substance of the teeth is so absorbed and lost. The fantastic shapes which the process assumes at times are surprising. I have patients where the grooves in the teeth are as clean cut as though they were filed out with a three-cornered file. I watch them for years, and the absorption goes on; and yet it is not the result of filing with a three-cornered file, nor anything of the kind. I cannot believe they are persons who brush their teeth away. I know people who have brushed their teeth in the old way, transversely, for a lifetime, and they are perfect to this day; and yet they have never been thoroughly cleaned; they loosely clean the mountain tops, while the valleys have been neglected. The way to clean the teeth is to clean them; to use all sorts of motions,—vertical, rotary, and horizontal.

The society then adjourned.

JAMES E. DEXTER, *Secretary*.

The society held a regular meeting, June 3, 1884. The president, Dr. Northrop, occupied the chair.

Dr. E. A. Bogue read the following paper on

"GOLD FILLINGS."

Mr. President and Gentlemen: I had the honor, at the last clinic given by this society, to operate before its members. My colleague at that clinic was Dr. Hodson, a gentleman with whom I differ entirely as to methods, but for the results of whose work, so far as I am acquainted with them, I have only the highest praise. The standard by which I gauge praise or condemnation must necessarily be the test of time.

Since that clinic I have been informed on all sides of the adverse criticisms that have been showered upon the heads of both your operators on that occasion, and I propose to inquire whether those criticisms are well founded, and are conducive to the sound instruction of this body, and to the encouragement of the better class of operators in showing their peculiar methods before it. If Dr. Hodson will pardon me for speaking of my own operations first, I will do so, and thus clear the way for his.

My object was to show how teeth having approximal cavities could be speedily separated with comparatively little pain, filled at the same sitting by fillings restoring the contour of the teeth, and without marring the protecting enamel immediately adjoining, leaving them in the best possible condition to resist future inroads of decay; and all this with little more expenditure of time, pain or labor than would be required for the ordinary so-called "slab fillings."

Step by step, as I advanced in my work, I stood back, handed my speculum-glass to the bystanders, and requested them to examine and criticise then and there. Dr. Corydon Palmer and Dr. Brockway were kind enough to do as requested, and their criticisms were thankfully received and acted upon, they being perfectly consonant with the views of the operator. Dr. Atkinson came later, and, although he had not seen the preliminary steps, he at once grasped the situation, acknowledged the feature that was new to him, and expressed his opinion on the spot, which I may here say was favorable to the filling already inserted in the molar, but adverse to completing the operation in the posterior side of the forward tooth, because the light was so bad that it would be impossible to finish successfully. The operations were, however, both completed, and were exhibited at the evening session. Whether they met approval there or not is for others to say. I will only venture this assertion, that no gentleman, out of the whole number assembled either at the clinic or at the meeting in the evening, had ever before seen two fillings of that character inserted in anything like the length of time that was actually given to these fillings, the strangeness of the place and the disorder of the instruments being left entirely out of the question.

Whether they shall prove to be good fillings, time alone can tell; yet every dentist whose training in the laws of mechanics would qualify him to practice his calling successfully, or enable him to understand the simplest problems in mechanics, knows full well what the probabilities are in any given case when the conditions are all stated. For example, taking those same two cavities of Mr. Cady's, the molar had an anterior approximal excavation of pretty large extent, fully one-thirty-second of an inch in depth, surrounded by strong walls on every side, save a little edge at the grinding surface. The cavity was arched at the cervical margin, toward the gum. The sides were nearly parallel, the exception being that on the lingual and buccal sides there was a slight undercut in the shape of a dovetail; while near the grinding surface the lines became again as nearly straight as possible,—that is to say, at right angles with the anterior face of the tooth, or as nearly that as might be without diminishing the strength of the remaining parts. The intention was to fill that tooth with cylinders, whose lower ends should rest upon the bottom of the cavity, and whose parallel laminæ of gold should be so nearly adapted to the nearly straight sides of the cavity that a very little pressure would result in a compact filling, shaped somewhat like a barrel, over the end of which a bit or two of rolled gold could be malleted and brought up to fill and cover the break in the grinding surface, by taking advantage of the cohesive quality of the gold. This filling was so inserted through the instrumentality of the screw separator, which gave me about a sixteenth of an inch of distance between the two teeth and the utilization of the dovetailed space cut through the grinding surface over the posterior cavity in the forward tooth, which was itself afterward filled. This posterior cavity of the bicuspid was also shaped with a view to its easy and substantial filling with cylinders in its lower portion,—that is, toward the gum,—and strongly cohesive gold with which to finish on the grinding surface. The cavity was, therefore, made parallel-sided as far as possible. The floor of the cavity—that is, the portion toward the pulp—was made nearly level. The cervical margin was slightly arched; two corners were made toward the gum on the lingual and buccal sides, to prevent the slipping of the first few pieces of gold, and the grinding surface was cut straight through to the cavity and distinctly dovetailed. A steel matrix, shaped like a penknife blade, was then placed between the two teeth, with the thick portion of the blade toward the gum, the edge reaching, perhaps, half way up the cavity. This cavity, like the other, was then filled, using cylinders along the cervical margin and down about two-thirds of the way to the cutting edge; at that point folded gold was inserted until the cavity was full, and then rolled gold was used, thoroughly annealed, to make the knuckle for contact with the molar and the biting surface at the grinding end.

As I before stated, time alone can decide whether these fillings are good or bad; but, having stated the principles which govern their insertion,—principles that underlie all mechanical operations of whatever nature,—the gentlemen present, and especially those who did me the honor to watch the operations throughout and who saw them afterwards, are certainly able to state the probabilities as to their future, and I here take leave of them.

We will now turn to Dr. Hodson's operation, which I had the opportunity of examining only very slightly at the time. This was a right inferior second molar, anterior approximal surface. The preparation for filling had been made before the patient appeared at the clinic. The pulp had been covered with oxyphosphate. The walls of the cavity had been made as straight as possible, and as nearly at right angles with the anterior face of the tooth as well as the grinding surface as was consistent with the dovetail toward the center. The only marked exception to this form was under the lingual and buccal cusps, where it was necessary to fill carefully by hand from below upward, or else cut off the cusps, which was deemed an unnecessary waste of tissue. And I may say right here that I have endeavored to assure myself of the correctness of this description by referring to Dr. Hodson himself.

After the acquaintance with Dr. Hodson that I have had for several years, I looked forward with pleasure to the opportunity of seeing him perform this operation with crystal gold. I did not see as much as I wanted to of it, but in a very short time I was called twice to look at it—once when it was about prepared and once when it was nearly finished. I have taken occasion since to inquire of Dr. Hodson as to the principles which underlie his operation, and find them as above stated.

The completed operation shows a filling which restores most beautifully the lost portion. The rounded bowl smoothly touches the adjoining tooth, and if we leave out of the question the fact that the adjoining tooth ought to have been filled before this one, I think nothing is lacking to the completeness and perfection of the operation. Dr. Hodson has followed nature's model and completely restored the rounded form of the tooth. In this case, as in my own, I recognize, however, that time alone will decide the question of perfection in the operation.

It is true that neither Dr. Hodson nor myself has been emulous of being called public operators. He has, I believe, occasionally responded, as he did at this time, when requested to clinic before members of the profession; but I cannot discover that it has been his usual practice to put in large conical gold fillings, shaped like the pyramids of Egypt, with the little end toward the root of the tooth and the big end outward, and expect those fillings to stay. Neither has he found it necessary within the last four or five years to entirely alter his mode of practice and to substitute gold crowns made in the laboratory for the large fillings which he formerly used to insert. Nor has it been his habit, as far as I know, to extract teeth or roots at random, regardless of whether those teeth or roots had any antagonist in the opposite jaw. And while I cannot learn that he ever warrants his work, I am sure that he does not expect two to three years to be the limit of its durability; especially in cases which have been left solely to his judgment, and in which he decided to perform very long, tedious, and expensive operations.

It does not require much skill nor much intelligence to make a large lump of cohesive gold foil, one end of which shall be in the cavity of a carious tooth. But to apprehend the reason of nature's design in the *form* of a tooth; to be able to remedy *de*formity, whether natural or acquired, whether from improper feeding or through decay; to understand the meaning of every curve and every projection and every depression, and to be able to combine these varying conditions into one that most nearly approximates health, is not so easy a task that a boy who has learned to make rubber plates in the laboratory may not only undertake to practice it, but may presume to instruct those whose studies in fine and comparative anatomy have made them silent before the problem.

I hold in my hand three gold fillings, one of them inserted June 8, 1878, at a cost of $30. In 1880 it came out, and here it is for inspection. The masticating end is as broad as the tooth; the side by which it should have been anchored is somewhat like the cone of a pyramid. Is it becoming in any gentleman who does this sort of thing to find fault with Dr. Hodson's operation? Here is another bicuspid filling, put in in December, 1878, at a cost of $25, by the same gentleman. I will inquire of the gentlemen present, lest I should be myself mistaken, whether mechanical laws have been obeyed in this filling? The third from the same hand speaks for itself,—at least, to my comprehension. The floor of the cavity was irregularly made; so irregular was it that I should feel it almost an impossibility for me to adapt a gold filling to it, seeing that gold is neither "putty in fact nor putty in principle." In the same mouth from which this bicuspid filling came I found a large gold filling in the grinding surface of the lower molar, and also a large buccal filling in the same tooth. These were both in good condition. But now comes the singular part of the story. Less than two years after these fillings were inserted I found cavities in both the posterior and anterior approximal sides of the tooth as large as the handle of an ordinary excavator, and no indication that was perceptible that these cavities had ever been filled. I was informed, however, that they were filled at the same time with the grinding-surface and buccal fillings; hence the fillings must have fallen out very soon after their insertion, for the cavities to be in such a state of decay that I did not know they had ever been filled. On the buccal side of the same lower molar, between the gold filling that was there and the gum, the tooth was decayed to an extent surpassing the cavity of decay which was filled; and, if my opinion is of any value, I will say that I should not think the tooth could have decayed to the extent I found it in either two years or six years; and I may further add that, having filled all three of these cavities four years ago myself, I found them four weeks ago in good condition.

Among my scraps of record I find the following, which was written while the patient was in the chair, June 2, 1882:

> On the Purely Mechanical Filling of Decayed Teeth.—I had occasion lately to examine a set of teeth of fairly good structure in the mouth of a young man about eighteen, of scrupulously careful habits relative to his teeth and gums, a patient of whom any dentist might be proud; and yet, for years to come, he is doomed to constant trouble and constantly recurring decay in his teeth. He has a large number of fillings, some of them very beautiful, and showing a great deal of skill in the ability to manipulate gold. A casual examination would result in an expression of pleasure at the beauty and perfection of the fillings, which were intended to repair the ravages of decay; and they are, indeed, so much in advance of the general standard of dental work of twenty years ago, that I wish to add my own tribute to its perfection in all places that are easy of access, and in some places as far back as the bicuspids.
>
> But there is a particular in which many, if not most of us, come short; that is, in our treatment of the cervical margins of approximal cavities; and it is here that the most conspicuous failures occur in the mouth under consideration,—that portion which Dr. Flagg styles the "vulnerable point," and Dr. Webb styles

"the point of defective manipulation." Now, which of these gentlemen is correct, or whether there may not be truth in both theories, it is not my province to determine.

My examination has just revealed fifteen cavities needing filling, of which seven are at the cervical margins of beautiful-looking fillings, put in just a year ago.

The fact that decay often supervenes after our best efforts to make the cervical margins perfect, and to leave no "vulnerable points" behind, will not be denied. The use of gold, in the form of mats or cushions, and cylinders loosely rolled, sufficiently attests the efforts made to obtain perfection at this point.

In this present instance perfection has evidently not been obtained. Now, can we, with a moderate degree of certainty, discover why? I think we can, and, if so, we may all draw our lessons of instruction from the palpable failure of our friend who operated in this case, and who has failed as conspicuously and in precisely the same manner, and for what, I think, are precisely the same reasons, in the cases of at least seven other different patients which have come under my observation in about a year. As this gentleman gives illustrations of his mode of operating, for the benefit of other members of the profession who may perchance not be so skillful as he, and has, I believe, in one instance, if not more, had it given out that a pecuniary compensation would not be unacceptable, his operations are, I think, specially open to criticism, providing it be fair and just. In the first place, then, he has used the file for his patient in a manner that I consider entirely unjustifiable. He has used it apparently to obtain room for examination. I say apparently, because the teeth thus filed have no fillings in their approximal sides, and never have had; but I think it quite safe to prophesy that they soon must have—*soon*, in this instance, meaning a few years at the furthest. The only preventive measure worthy of any attention thus far suggested, other than to enjoin perfect cleanliness on the part of the patient, is the Arthur plan of treatment, in regard to which so many of us think that the teeth which need it the most are the least benefited by it. He has failed to contour his fillings properly, although many of them are very large and rudely represent a tooth in size, but back of the six front teeth none of them represent a tooth in form. The faces of his approximal fillings are, I believe, all flat or nearly flat, so that when food is, by the action of mastication, forced in between the teeth, it remains there, no provision being made to have the space self-cleansing.

It seems to me that our work should be approached in a spirit, if I may so express myself, of reverence. We are not at work upon a *plank*, which we are rudely fashioning into a shape to please ourselves, but we are working upon tissues delicately and accurately made—adapted to the uses which they are designed to subserve. Their form and position are essential elements to their permanence as well as to their usefulness; and he who fails to recognize this in every step of his work falls short of doing the good he might do, and fails in the permanency of his operations. In the first place, we should be sure that there is room enough both to see and to reach every portion of these approximal cavities, being fully determined to *do* it, and not merely to do *at* it. We should be determined that the cervical margins of these approximal cavities shall be perfectly filled,—that is to say, that the gold shall be in as absolute contact with that cervical wall as though it were the posterior wall of a grinding cavity in a molar. If the conditions will allow a soft cylinder or mat laid flat upon the cervical wall of the cavity, with the end projecting, it will form as perfect an adaptation as the leaves of a book form to their cover, and for the same reason, namely, that the leaves of gold all lie flat and parallel to one another, just as the leaves of the book do. If from this foundation—made of non-cohesive foil, if you please—the filling is built up to restore the real, or in some instances the ideal, contour of the tooth, I think, in the great majority of cases, the operator will be rewarded by finding his "vulnerable point" no more liable to decay than the remaining circumference of the same cavity.

I have spoken of the ideal contour of a tooth. By this I mean that form which has proven itself to be the most durable as well as the most useful. It is short; it is rounded; it is thick from before backward; it approximates a drop of water; it touches its neighbor at only a point, and food crowded through between it and its neighbor must necessarily be so finely comminuted that the fluids of the mouth can wash it away. These teeth last in spite of neglect, while the long, flat, broad teeth of light color and loose texture melt away. We should, therefore, restore or produce the shape of the first described tooth, and not of the last.

At the risk of bringing in my record book too often, I will quote one more passage bearing upon this subject:

> Contour filling, put in summer of 1878. Profile slightly exaggerated. January 1, 1882, margins found perfect; teeth requiring nothing, while fillings equally solid, made simply flush with the adjoining side of the cavities in 1880, have decayed so far at the margins as to require additional fillings.

Dr. William H. Atkinson. I want to thank Dr. Bogue for presenting us this paper, and at the same time to say that such a paper could not have been written many years ago, for the reason that there were few who were well enough acquainted with the principles involved in filling teeth to get up such a paper, or even to comprehend it. I also want to thank the doctor for the demonstration of fillings that seemed to be well impacted in the cavities, and which were of such a shape that it is a marvel they staid in at all. The criticisms that are made by self-sufficient novices who witness operations in clinical practice were very well and modestly spoken of. In my earlier days I would have been irritated by that kind of thing, but the man who is in earnest can afford to be criticised, even unjustly, because it is getting him out of his own darkness. If we were more earnest in getting the ignorance out of ourselves, and more kindly and affectionate towards those who are willing to sacrifice their time and ease for the sake of the spirit of truth, I think our clinics would be better attended and more highly appreciated than they are by some. We owe more to clinical instruction than to all other means of growth that we have. I have said, probably *ad nauseam*, that the dentist who does not make his calling his religion is not fit to be a dentist. I am very much warmed towards Dr. Bogue for the expression of sentiments he has made. Those of us who came into the profession without instruction feel quite disposed to be lenient toward others; but the time is passed when men are entitled to practice under inspiration only, and without the instruction and help of their seniors. If we could always get such instruction as we have had before us to-night, eliminating the personal element entirely, so that we should not have our sympathies exercised toward the individual who was hit,—for I am always with the under dog in the fight,—I think it would help us very much. I admire the boldness, or audacity, or honesty, or whatever it is, that impels a man to say what he thinks and look upon his own manipulations with the same degree of mental sharpness of criticism that he uses in regard to those of others who fail to meet his views. I suppose I may have been thought to be cheeky, by reason of my advocacy of that kind of teaching; but I owe more to earnestness and a desire to get at the truth and exposing myself to the sharp criticism of sharp minds than to almost any other circumstance; and cheeky, and independent, and bold as I may have seemed to be, I do not think there is a man in the profession who is more tender, or more susceptible to mere criticism. But I am not afraid of criticism. I can afford to be criticised, and I thank the man that criticises me, for if it is real criticism it tends to perfection of work.

Dr. Bogue. I will say that, so far as I know, none of the gentlemen who most severely criticised the operations at the clinic after the clinic was over are in the room. Furthermore, I will disclaim any desire to hurt any one's feelings in any way, or to make any of my remarks personal. These should be considered as purely theoretical and professional, and in no sense personal.

James E. Dexter, *Secretary.*

(To be continued.)

NATIONAL ASSOCIATION OF DENTAL EXAMINERS—SECOND ANNUAL SESSION.

The second annual session of the National Association of Dental Examiners convened in the Town Hall, Saratoga, Friday, August 8, 1884. President J. Taft in the chair.

The following State boards were represented:

Georgia.—G. W. McElhaney.

Illinois.—George H. Cushing, A. W. Harlan.

*Maryland.**—Edward P. Keech.

*New Jersey.**—F. A. Levy, F. C. Barlow, C. W. Meloney.

Ohio.—H. A. Smith, J. Taft.

Pennsylvania.—J. C. Green, C. N. Peirce, S. H. Guilford, E. T. Darby.

Vermont.—James Lewis, G. H. Swift, S. D. Hodge.

*West Virginia.**—C. A. Wingerter.

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* New members.

Dr. Peirce announced that a committee was in waiting to communicate to the association the results of a meeting held by the college faculties for the furtherance of educational interests. On motion it was ordered that the committee be received.

Dr. Frank Abbott, representing a committee from the National Association of Dental Faculties, was then introduced, and stated that the association which he had the honor to represent had been formed at a meeting of delegates from a number of the dental colleges. Of these the representatives of ten had subscribed to the constitution adopted, and had participated in the subsequent meetings of the association. The association had taken action on several matters which they deemed important to the future of dental education, and they had thought it advisable to bring the results of their deliberations before this body, and to that end had appointed the committee for which he spoke, his colleagues having placed the mission with which they were charged in his hands. Dr. Abbott read the resolutions adopted by the National Association of Dental Faculties.* Continuing, he said that the National Association of Dental Examiners, according to the recent decision in Illinois, hold a strong position, in that, to a great extent, it has the power to say who shall and who shall not practice in the various States whose examining boards are represented in it; a word from this body in the right direction will therefore have a strong influence. He thought that if a little effort were put forth the other colleges might be induced to join the association of faculties in their work.

The report was received and placed on file.

The secretary read a communication from Dr. M. H. Chappell, of the Indiana board, stating that the board had used its best endeavors to induce the Indiana Dental College to conform to the requirements of the National Association of Dental Examiners. The college now conforms to the standard, and its authorities had asked the State board to request the national association to remove any restrictions against the college diplomas, so that they might be received as those of any other reputable institution.

Dr. Cushing. The diplomas granted in the future, if they come up to the requirements, will be received, of course; but as to receiving those issued in the past, under the old plan of graduation—that is a question.

Dr. Peirce could not see how we could take action on what had occurred in the past.

The communication was received and filed.

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* See report National Association of Dental Faculties, page 560, current number of the DENTAL COSMOS.

Dr. Guilford said that at the February meeting of the Pennsylvania board three colleges, the two in Baltimore and the Indiana college, were reported as not conforming to the requirements of this association. They sent requests that the board indorse their diplomas on their promise to conform in the future. The board replied that it would do so when informed that the colleges had so changed their methods of graduation as to come up to the standard required.

Dr. Keech said the law recently enacted in Maryland provided for the registration of dentists in actual practice. The board had had some cases under this clause which they found it difficult to decide. For instance, one party who has out a sign "cupper, leecher, and extractor of teeth," asked to be registered on the ground that he was a practicing dentist. Another case: The party is a first-class mechanical workman; he has no sign, and the speaker was not sure that he had ever filled a tooth; he works in a laboratory, doing that class of work; the speaker had been told that he had taken probably six impressions and made teeth from them, but that was not his business, which was to make a pivot-tooth, or a set of teeth—whatever may be given to him to do—from an impression supplied. This last man has not yet made application for registration, but he intends to. The board would like suggestions from those who have had experience as to what to do under such circumstances.

The president regarded Dr. Keech's query as a legitimate subject for consultation. There should be uniformity in our practice, as near as may be.

Dr. Guilford said that no such case had ever occurred in Pennsylvania, but he thought the proper course would be to refuse registration and let the party bring the board into court.

Dr. McElhaney. We have had a law regulating the practice of dentistry in Georgia for twelve years, and a registration clause six years. By this latter clause every dentist must register with the clerk of the superior court of his county. You will find that it will take ten years from the time your law goes into effect to get over all the difficulties of this nature.

Dr. Wingerter thought that it was not the intention of the legislatures to pass *ex post facto* laws. If this be true, these men would have to be allowed to practice until they die off. The intention is to make a standard for the future.

Dr. Cushing. In Illinois the registration is required to be made with the examining board. There is no registration with the county clerks except of the certificates issued by the board. He then read the affidavit required of the applicant, and said that there had been many cases like those spoken of by Dr. Keech, and the board has held that it could not under the law require any other evidence as to the applicant's right to registration than the affidavit, and the attorney-general of the State has so held. Furthermore, there had been a decision as to what constitutes a medical practitioner, in which the court held that one professing to cure disease was a physician. If that were the case it would be very difficult to convict, and our board has thought it wise not to attempt too severe a construction of the law, hoping that in the course of time the difficulty would find its own remedy. In this view it has thought it was better to attempt as little as possible of coercion in other directions. Our law requires registration within six months, those who fail to register being required to pass an examination before the board of examiners; but the attorney-general says that it was not the intention of the law to disturb those in actual practice, so that this provision was not reasonable and could not be enforced. We have had several applicants who failed to register within the time required, but upon making the required affidavit we have given them registration. In a recent consultation with the attorney-general as to the board's power to revoke the licenses of men who had sworn falsely, he said the board unquestionably had authority to revoke the license or erase the name of any man from the registration lists if it had evidence that he had perjured himself; but he remarked that it would be very difficult to prove an offense of that character.

Dr. McElhaney thought it was better that the registration be with the State board than with the county clerks. The latter don't care about the matter and don't push it, but if the books were kept by the examining boards the names would be properly recorded.

Drs. Peirce and Guilford also favored requiring that the registration be made with the examining boards.

Dr. Abbott, being called on for his views, said the New York act required registration within sixty days from the time it became a law. Registration consisted in going to the county clerks of the several counties and taking oath to the effect that the affiant was in actual practice at the time the law was passed. Afterwards the registration books were opened for twenty or thirty days for those who failed to be registered within the required time. A subsequent amendment required all who thereafter entered the profession to be possessors of a diploma from some reputable college of the State board of censors; then they must register name and address, and place and time of graduation. We have never attempted to do anything with those who were actually in practice; the difficulty has been to keep out of the State those who were not qualified. The matter of qualifications is in the keeping of the board of censors. We have also a committee on dental law, which is in communication with every county clerk in the State, and every county clerk has a list in his office containing the name of every medical and every dental college whose diploma is recognized. If a man holding a diploma from a college not on the list makes application for registration, he is refused. The process of weeding out is going on, and we hope in a short time to get out all who are illegally in practice.

Dr. Guilford offered a resolution that the proceedings of this meeting be published in pamphlet form. Adopted.

Dr. Cushing offered the following:

Resolved, That this association instructs its members, after June, 1885, to recognize as reputable no dental college which does not require as a requisite for graduation attendance upon two full regular courses of lectures and clinical practical instruction, which courses shall be of not less than five months' duration and shall be held in separate years, with practical instruction intervening between the courses; and that does not require preliminary examination of applicants before matriculating them.

Dr. Keech. The Baltimore College of Dental Surgery is vested with the power, which cannot be taken away from it, to grant a diploma to any man who can pass a satisfactory examination. The legislature requires the State board to recognize the diploma of any college of the State of Maryland, but not those of other States; so that it must recognize the diplomas of this college. He had been informed that the Baltimore College would not hereafter grant diplomas on examination, but another faculty coming in might reverse this decision; the right to issue diplomas under such circumstances is held in abeyance. The resolution could not be binding on his board so far as this school was concerned, but he was here to pledge his board to carry out the resolution so far as moral force could go.

Dr. Lewis. All laws require moral suasion. He was glad to see the quarrel between the Baltimore colleges. The revelations which it had caused would have the effect of cleaning out the system of granting diplomas on examination. He hoped that the session just closed would be the last at which these frauds could be perpetrated.

Dr. Cushing moved an addition to the resolution exempting the Maryland board from enforcing the rule so far as the colleges of its own State were concerned, and the resolution as amended was then adopted.

Dr. McElhaney offered the following, which was adopted:

Resolved, That we recommend the dental colleges not to grant free scholarships to State societies through the recommendation of the examining boards.

Adopted.

Dr. Peirce offered the following as a substitute for the resolution on the same subject adopted last year:

Resolved, That this association insists that no boards hereafter organized and becoming connected with this body shall confer degrees or titles of any nature.

Dr. Guilford moved to amend by merely rescinding the third resotion adopted last year. Adopted.

Dr. Peirce again offered his resolution. He thought its passage might save other States from making the same mistake New York had.

The resolution was then adopted.

The association then proceeded to the election of officers for the ensuing year, with the following result: J. Taft, president; G. W. McElhaney, vice-president; Geo. H. Cushing, secretary and treasurer.

Adjourned to meet in New Orleans, the last Tuesday in March, 1885.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

Pursuant to a call published in the dental journals, representatives of a number of the dental colleges met at the Sturdevant House, New York, August 4, 1884, for the purpose of bringing about the adoption of a uniform standard of graduation. The following schools were represented:

Baltimore College of Dental Surgery.—Professors R. B. Winder and M. W. Foster.

Boston Dental College.—Professors J. A. Follett and A. N. Blodgett.

Chicago College of Dental Surgery.—Prof. A. W. Harlan and Dr. F. H. Gardiner, chairman of the executive committee.

Harvard University, Dental Department.—Prof. Thos. Fillebrown.

Dental Department, State University of Iowa.—Prof. A. O. Hunt.

New York College of Dentistry.—Professors Frank Abbott and J. Bond Littig.

Dental College of the University of Michigan.—Prof. J. Taft.

Ohio College of Dental Surgery.—Prof. H. A. Smith.

Pennsylvania College of Dental Surgery.—Professors C. N. Peirce and Henry Leffmann.

Philadelphia Dental College.—Professors J. E. Garretson and S. H. Guilford.

University of Pennsylvania, Dental Department.—Professors James Truman and E. T. Darby.

Letters were also received from the deans of the Kansas City Dental College and the University of California Dental Department, indorsing the objects of the meeting and pledging their support to the movement.

Prof. M. W. Foster called the meeting to order, and briefly stating its objects, nominated Dr. C. N. Peirce for temporary chairman. Dr. Peirce was elected, and Dr. H. A. Smith was chosen secretary of the temporary organization.

A committee on permanent organization, consisting of Professors Truman, Winder, and Taft, was appointed, and the meeting took a recess to allow the committee time to prepare a report.

After the recess the committee reported the constitution which they had agreed upon, which was amended and adopted, as follows:

CONSTITUTION.

NAME.

Art. I. This body shall be called the National Association of Dental Faculties.

OBJECTS.

Art. II. The objects of this association shall be to promote the interests of dental education.

OFFICERS.

Art. III. The officers shall consist of a president, a vice-president, secretary, and treasurer, who shall be elected by ballot and shall hold their offices till their successors are elected.

QUORUM.

Art. IV. Two-thirds of the colleges belonging to this association shall be necessary to constitute a quorum.

Art. V. Any contemplated change involving the interests of the schools represented or of the association shall require one year's notice before any action is taken.

EXECUTIVE COMMITTEE.

Art. VI. Three members shall be elected who with the officers shall constitute an executive committee, who shall have power to designate the time and place of the meeting and make preparations for the same, and pass upon all credentials.

MEMBERSHIP.

Art. VII. Any reputable dental college may be represented in this body upon submitting to the executive committee satisfactory credentials, signing the constitution, conforming to the rules and regulations of this body and paying such assessments as may be made.

The constitution as adopted was then signed by the representatives of the Baltimore College of Dental Surgery, Boston Dental College, Chicago College of Dental Surgery, Dental Department of the State University of Iowa, Dental College of the University of Michigan, New York College of Dentistry, Ohio College of Dental Surgery, Pennsylvania College of Dental Surgery, Dental Department of the University of Pennsylvania, Philadelphia Dental College.

Prof. Fillebrown said that while he was in hearty sympathy with the movement, there had been no opportunity to have the matter brought before the governing board of Harvard University, and he was therefore not authorized to bind the institution by becoming a member of the association.

On motion of Prof. Taft, it was ordered that any dental college which desires to join this association during the intervals between its meetings may be enrolled upon sending its application to the committee on membership, accompanied by satisfactory evidence that it has complied with the rules and regulations of the association, and paying the assessments.

The following officers were then elected: C. N. Peirce, president; R. B. Winder, vice-president; H. A. Smith, secretary; A. W. Harlan, treasurer; Frank Abbott, James Truman, J. Taft, members of the executive committee.

Prof. Winder moved the abrogation, after the close of the session of 1884–5, of the clause in the requirements for graduation of the schools belonging to this association accepting five years' practice as the equivalent of a first course of lectures.

Prof. Taft inquired if it was the intention of the motion to rule out absolutely the acceptance of any term of practice—whether it be five years, ten years, or twenty years—in lieu of a course of lectures.

Prof. Winder replied that the motion was one of inquiry—to get at the sense of the association on the subject.

Prof. Truman moved as a substitute that after the close of the session of 1884–85 students at the dental colleges be required to attend two full regular courses of lectures before coming up for graduation. Adopted, with a proviso offered by Dr. Harlan to the effect that the two courses of lectures shall have been attended in separate years.

Prof. Smith offered a resolution that possession of a medical diploma be accepted as equivalent to one course of lectures in a dental school, provided the holder pass a satisfactory examination.

Prof. Abbott moved to amend by compelling the holder of a medical diploma, before coming forward for graduation, to pass one full year in the study of practical dentistry, which year should include a regular course of lectures in a dental college.

Prof. Smith suggested that the practical studies should be pursued in a dental infirmary and not in a dental office. The suggestion was incorporated in the resolution, which was then adopted.

Prof. Abbott offered the following resolution:

Resolved, That attendance on one course of lectures in a medical college be accepted as equivalent to one year's pupilage in a dental office, but one-year medical students shall be required to attend two regular courses of lectures in a dental college.

This resolution was debated at some length, but was finally adopted.

Prof. Taft offered the following, which was adopted:

Resolved, That we recommend that three years' study of dentistry, including attendance upon two regular courses of lectures, be required of students previous to coming forward for graduation from a dental college.

A committee on curriculum, consisting of Profs. Taft, Truman, and Winder, was appointed, and the association adjourned till 3.30 P.M.

At the afternoon session Prof. Winder moved that the association meet biennially.

Prof. Taft moved to amend by appointing the next meeting for one year hence, and to meet biennially after that. So ordered.

As it was apparent that the business for which the meeting was called could not be completed to-day, it was agreed, in view of the fact that nearly all the delegates would be in Saratoga, to hold an adjourned session at that place to-morrow evening.

Prof. Garretson offered the following resolution, which was under discussion when the hour of adjournment arrived.

Resolved, That the colleges of this association will receive into the senior class only such juniors as hold certificates of having passed a satisfactory examination in the studies of junior year; this certificate to be a pledge to any college to which they may apply that a previous term has been properly spent in the institution whence they came.

Adjourned to meet in Saratoga, to-morrow, at 7.30 P.M.

At the meeting in Saratoga all the colleges which had signed the constitution were represented.

The resolution offered by Prof. Garretson at the previous session was referred to the committee on curriculum.

Prof. Taft, from the committee on curriculum, submitted a report, recommending preliminary examinations and a graded curriculum, both of which will be found in the resolutions adopted.

The first recommendation of the report was taken up, and after lengthy discussion the following resolutions were adopted:

Resolved, That a preliminary examination be required for entrance to our dental colleges; such requirements shall include a good English education. In case of any applicant failing to pass a satisfactory preliminary examination, the other colleges of this association may be informed of the fact.

Resolved, That a candidate for matriculation who presents a diploma from a reputable literary institution, or other evidence of literary qualification, shall be admitted without further examination.

The association then adjourned.

At the session on Wednesday afternoon the recommendation of the committee on curriculum regarding the establishment of graded courses of study was taken up, and Prof. Abbott offered the following resolution, which was adopted:

Resolved, That we agree to adopt a graded course of instruction and an intermediate examination, which course of instruction and examination shall be conducted as the faculties of the different colleges represented in this association may deem proper.

We recommend that the following subjects and arrangement be adopted by the colleges of this association, viz.:

First Year.—Anatomy, with dissections; physiology, histology, chemistry—didactic and practical; mechanical dentistry.

Second Year.—Review of junior year studies; pathology, surgery, materia medica, therapeutics, and operative dentistry.

A committee, consisting of Profs. Foster, Abbott, and Hunt, was appointed to lay before the National Association of Dental Examiners the action taken by this association.

The secretary was authorized to send a printed copy of the transactions to each of the schools represented in the association.

Adjourned.

NATIONAL DENTAL ASSOCIATION OF THE UNITED STATES OF AMERICA.

At the regular biennial meeting of the National Dental Association of the United States of America, held in Washington, D. C., the following officers were elected: R. B. Winder, Baltimore, president; John B. Rich, New York, first vice-president; V. E. Turner, Raleigh, N. C., second vice-president; W. W. Ford, Macon, Ga., third vice-president; E. Parmly Brown, fourth vice-president; J. H. Coyle, Thomasville, Ga., fifth vice-president; R. Finley Hunt, Washington, D. C., secretary; T. M. Hunter, Fayetteville, N. C., assistant secretary; H. B. Noble, Washington, D. C., treasurer; F. C. Barlow, Jersey City, N. J., assistant treasurer; John B. Rich, R. B. Winder, John Allen, V. E. Turner, and J. Curtiss Smithe, committee on correspondence with the United States Government.

The president reported the following nominations: E. Parmly Brown, Flushing, L. I., to be chairman of Section II., Operative Dentistry; J. L. Williams, New Haven, Conn., to be chairman of Section VI., Histology and Microscopy; J. J. R. Patrick, Belleville, Ill., to be chairman of Section XI., Metallurgy.

The nominations were confirmed. Dr. Brown reported as his associate on Section II., Dr. T. Sollers Waters, of Baltimore.

Dr. R. B. Winder, Baltimore, was elected chairman of Section IV., Anatomy and Physiology.

An additional Section on Museum and Library was established, and the ultimate number of members for each Section was fixed at twenty.

Adjourned to meet on the fourth Tuesday in July, 1886.

DENTAL PROTECTIVE UNION.

After the adjournment of a special meeting of the First District Dental Society, held in the City of New York, July 2, 1884, on motion of Prof. Frank Abbott, a mass meeting was organized for the purpose of forming a Dental Protective Union.

Dr. William H. Dwinelle was elected president; Dr. W. A. Bronson, treasurer; and Dr. John M. Crowell, secretary.

The officers were appointed a committee to inform the profession of the formation of the Dental Protective Union, which has for its object the protection of the dental profession from unjust prosecution for infringement of so-called dental patents.

The committee request all dentists who are threatened with prosecution to inform them of the fact, that they may investigate the matter, and advise them of their rights and aid in their defence.

All communications to be addressed to the secretary, at No. 104 West Forty-second street, New York City.

In pursuance of the objects above noted a mass meeting of the dentists in attendance on the sessions of the American Dental Association was held in the Town Hall, Saratoga, August 7, 1884.

Dr. W. H. Dwinelle was called to the chair, and F. L. Hise was elected secretary.

Dr. Dwinelle stated the object of the meeting at some length. He said that the dental profession had suffered from patents surreptitiously obtained by men who attempted to dictate the terms on which we might use the products of our own inventive faculties. Twenty years ago we were the subjects of the Goodyear monopoly, which was founded on an invention that belonged to dentistry. We formed a protective union to fight it, but though we did not win, Josiah Bacon told the speaker that the protective union cost the Goodyear Company $500,000. That work showed what could be done by associated effort. Now the International Tooth-Crown Co., managed by L. T. Sheffield, claims tribute from the dental profession for setting what has come to be known as the Richmond crown and for bridgework. The patents on which its claims are made were granted for methods which had been in public use more than two years, and hence were not patentable. Unless prompt action is taken, Dr. Sheffield will soon have collected money enough from those who are willing to pay tribute to enable him, by selecting the cases and getting decisions here and there in favor of the company, to weave a chain that will be difficult if not impossible to break. The whole claim is baseless; even the patent upon which all the others are founded is for a thing long in use. You will find a full description of it in the *American Journal of Dental Science* for April, 1855.

Dr. Dwinelle then read extracts from a letter from Mr. Gordon (whose history of the suit brought against the Richmond brothers will be found in the DENTAL COSMOS for August, page 485, *et seq.*), advising prompt action on the part of the dentists to save more difficult and more expensive work later.

Dr. G. W. Melotte, of Ithaca, N. Y., stated that he had taken out a license and had paid already nearly two hundred dollars, but was willing to contribute to contest the patents.

Dr. Dwinelle read a list of dentists in New York who had subscribed to the Protective Union. He called on Dr. A. S. Richmond to state the evidence in his possession regarding the worthlessness of the patents.

Dr. Richmond gave a brief statement of his knowledge of the Richmond crown*, and detailed the history of his own and his brother's connection with the Richmond Tooth-Crown Co., which was the predecessor of the present company, and stated that among the recommendations published by Sheffield were letters commending work done by the speaker and his brother, which were written two years before the patent was issued. He said that suits against Mills, Muller, and Berkowitz were to come up in September or October.

The subject was further discussed by Drs. E. S. Gaylord, W. W. Allport, James Lewis, C. W. Spalding, W. C. Barrett, George J. Friedrichs, and R. Finley Hunt, warmly commending the formation of the Dental Protective Union, and pledging their support to its objects.

Dr. W. W. Allport offered the following resolution, which was adopted:

Resolved, That the chair appoint two dentists from each State for the purpose of securing members for the Dental Protective Union and for collecting money and evidence, and doing whatever may be needful in defending the profession against the patent claim of the International Tooth-Crown Co., or any other patent that may be issued that may be considered illegal.

Adjourned.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

THE annual meeting of the South Carolina State Dental Association was held at Spartanburgh, S. C., July 8, 1884.

The officers elected to serve for the ensuing year are as follows: D. L. Boozer, president; J. T. Calvert, first vice-president; J. H. Burnett, second vice-president; J. A. Miles, corresponding secretary; R. A. Smith, recording secretary; L. S. Wolfe, treasurer.

J. ALLEN MILES, D. D. S., *Corresponding Secretary*,
Charleston, S. C.

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* See DENTAL COSMOS for July, 1884, p. 41.

MINNESOTA STATE DENTAL SOCIETY.

The Minnesota State Dental Society held its first annual meeting at St. Paul, the sessions commencing July 16, 1884, and continuing three days.

The society starts off promisingly, enrolling at this first meeting forty-eight members.

Active steps were taken and committees appointed to effect dental legislation in the State of Minnesota.

The officers elected for the ensuing year were as follows: L. W. Lyon, president; F. A. Williamson, vice-president; H. L. Cruttenden, recording secretary; J. H. Martindale, corresponding secretary; A. T. Smith, treasurer.

The society adjourned to meet the third Wednesday in July, 1885, at Minneapolis.

J. H. Martindale, *Recording Secretary*,
No. 412 Nicollet avenue, Minneapolis, Minn.

CENTRAL ILLINOIS DENTAL SOCIETY.

The third annual meeting of the Central Illinois Dental Society will be held in Pontiac, Ill., on the 9th, 10th, and 11th of October, 1884.

Several papers of interest will be read.

C. R. Taylor, *Secretary*, Streator, Ill.

HARVARD UNIVERSITY—DENTAL DEPARTMENT.

At the annual commencement of Harvard University, held in June, there were ten graduates in the Dental Department, upon whom the university degree of D.M.D. (Dentariæ Medicinæ Doctor) was conferred, as follows:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
Charles Lincoln Abbott	Mass.	George Henry Gerry	Mass.
Frederick William Bevington	Mass.	Charles Franklin McDonald	Mass.
Henry Parsons Cooke	Mass.	Ned. Albert Stanley	Mass.
Charles Percy Curtis	Italy.	Jere Edmund Stanton, M.D	Mass.
Arthur Crowell Gerry	Mass.	Alfred Horace Tester, L.D.S	England.

EDITORIAL.

TO CONTRIBUTORS.

In consequence of the amount of space required to present the reports of the several societies, we have been compelled to omit the usual "Original Communications" department for this number.

THE DENTAL COLLEGES AND THEIR EXECUTIVE OFFICERS.

Baltimore College of Dental Surgery. R. B. Winder, Dean, 140 Park Ave., Baltimore, Md.

Ohio College of Dental Surgery. H. A. Smith, Dean, 286 Race St., Cincinnati, O.

Pennsylvania College of Dental Surgery. C. N. Peirce, Dean, 1415 Walnut St., Philadelphia, Pa.

Philadelphia Dental College. J. E. Garretson, Dean, 1537 Chestnut St., Philadelphia, Pa.

New York College of Dentistry. Frank Abbott, Dean, 22 W. Fortieth St., New York, N. Y.

Missouri Dental College. H. H. Mudd, Dean, 500 N. Jefferson Ave., St. Louis, Mo.

Boston Dental College. J. A. Follett, Dean, 219 Shawmut Ave., Boston, Mass.

Harvard University, Dental Department. Thomas H. Chandler, Dean, Hotel Bristol, Boston, Mass.

Dental College of the University of Michigan. J. Taft, Dean, Ann Arbor, Mich.

Western College of Dental Surgeons. C. W. Spalding, Dean, 1525 Olive St., St. Louis, Mo.

University of Pennsylvania, Dental Department. Jas. Truman, Secretary Dental Faculty, 1513 Walnut St., Philadelphia, Pa.

Dental Department of the University of Tennessee. R. Russell, Dean, 53 N. Summer St., Nashville, Tenn.

Indiana Dental College. Junius E. Cravens, Secretary, 46 East Ohio St., Indianapolis, Ind.

Dental Department of Vanderbilt University. W. H. Morgan, Dean, Nashville, Tenn.

Kansas City Dental College. J. D. Patterson, Secretary of the Faculty, 800 Main St., Kansas City, Mo.

University of California, Dental Department. S. W. Dennis, Dean, 530 Sutter St., San Francisco, Cal.

Dental Department of the University of Maryland. F. J. S. Gorgas, Dean, 259 N. Eutaw St., Baltimore, Md.

State University of Iowa, Dental Department. L. C. Ingersoll, Dean, Keokuk, Iowa.

Chicago College of Dental Surgery. Truman W. Brophy, Secretary, 125 State St., Chicago, Ill.

Dental Department of Minnesota College Hospital. F. A. Dunsmoor, Dean, Minneapolis, Minn.

Royal College of Dental Surgeons of Ontario. J. Branston Willmott, Secretary, Mechanics' Institute, Toronto, Canada.

BIBLIOGRAPHICAL.

THE NATIONAL DISPENSATORY. Containing the Natural History, Chemistry, Pharmacy, Actions and Uses of Medicines. Including those recognized in the Pharmacopœias of the United States, Great Britain, and Germany, with numerous References to the French Codex. By ALFRED STILLÉ, M.D., LL.D., Professor Emeritus of the Theory and Practice of Medicine and of Clinical Medicine in the University of Pennsylvania; and JOHN M. MAISCH, Phar. D., Professor of Materia Medica and Botany in the Philadelphia College of Pharmacy. Third Edition, thoroughly Revised, with Numerous Additions. With 311 Illustrations. Royal octavo, pp. 1755. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $7.25; leather, $8.00; half Russia, $9.00.

This third edition of this stupendous work includes an immense mass of new material, embodying the latest revisions of the Pharmacopœias of the four chief civilized nations. The authors state that a large portion of the work has been re-written. The extent of the additions may be estimated from the fact that the general index of this edition contains over thirty-seven hundred more references than that of the second edition, and the index of therapeutics contains nearly sixteen hundred new references. The practical completeness of this huge volume tells of the unwearied industry, of the unremitting labor of its distinguished authors through many years. It is in fact what it was in design,—a concise but complete statement of all that is of practical importance to the pharmaceutist and physician in materia medica and therapeutics.

A valuable feature in the present edition is the reference to authorities, thus directing those who wish to extend their investigations to the sources of original information.

The physician, the pharmacist, the student in medicine or pharmacy must find a library incomplete which does not contain a copy of Stillé and Maisch.

MANUAL OF PHYSIOLOGY: A Text-book for Students of Medicine. By GERALD F. YEO, M.D., F.R.C.S., Professor of Physiology in King's College, London. Small octavo, 750 pp. Philadelphia: P. Blakiston, Son & Co., 1884. Price, cloth, $4.00; leather, $5.00.

A somewhat careful examination of this new elementary treatise on physiology justifies us in characterizing it as admirable—in fact, as the best work on the subject for the use of students which has yet been produced. The author has had the wisdom to omit nearly everything not strictly relevant to his subject—such as histories of the growth of knowledge, unestablished theories, and lengthy discussion of exceptional points. Beginning with compact definitions of morphology and physiology, and an explanation of the objects of physiology, the thirty-eight chapters into which the volume is divided deal in a methodical, terse yet comprehensive manner with the topics indicated by their titles. A brief but clear description of the anatomy of the part discussed forms a portion of each chapter, while illustrations, with full descriptions attached, supplement the explanation given in the text.

The avoidance of unnecessary technicalities is a marked feature of the volume, the author thinking it better, as he expresses it in the preface, that the beginner should acquire the first principles of the science in homely language than pick up technical odds and ends in learned terms, the meaning of which he does not comprehend. A glossary and index are appended.

MATERIA MEDICA AND THERAPEUTICS: An Introduction to the Rational Treatment of Disease. By J. MITCHELL BRUCE, M. A. Aberd., M.D. Lond. 12mo., pp. 547. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $1.50.

This volume, intended as a manual for students of medicine, is not merely a compend of the Dispensatory, as might be inferred from its title, but is meant to be a rational guide in the treatment of disease. The materia medica is presented in a natural and concise arrangement, while the special therapeutics is taught by tracing systematically the physiological action and uses of the various drugs in their passage through the body, from their first contact with it locally until they are eliminated in the secretion. The actions and uses of remedies are discussed under the headings of the physiological systems of the body.

As an instance illustrative of the method pursued, we will take chloroform: Officinal and common name; chemical symbol; source; characters; impurities; dose; preparations and their doses; local action and uses; action on the blood; specific action and uses; phenomena of chloroform anesthesia, first, second, and third stages; analysis of the phenomena; specific uses; method of administration; precautions to be observed; selection of cases; preparation of the patient; selection of the anesthetic as to purity; selection of the apparatus; position of patient; administration; complications; unfavorable symptoms; after treatment; remote local action. This comprehensive presentation of the subject, which is at the same time sufficiently detailed, occupies less than eight pages.

We heartily commend the book as a valuable addition to the library of student and practitioner.

DISEASES OF THE THROAT AND NOSE, including the Pharynx and Larynx, Trachea, Œsophagus, Nose, and Naso-Pharynx. By MORELL MACKENZIE, M.D., London. Vol. II., with Index of Authors and Formulæ for Topical Remedies. Illustrated. Octavo, pp. 550. Philadelphia: P. Blakiston, Son & Co., 1884. Price, cloth, $3.00; leather, $4.00.

The first volume of this treatise was noticed in these pages when it appeared, four years ago. The present volume fully maintains the high standard which characterized its predecessor. The vast experience of the author, the most distinguished English specialist in this class of diseases, has enabled him to make this work encyclopedic in character. It is written in a fluent style, and with a clearness of description which not only makes it pleasant reading, but an invaluable guide in the treatment of the conditions discussed. Dr. Mackenzie states in his preface that the work has been in progress for nearly twelve years, and that during that period there is scarcely a page that has not been re-written many times. It is a systematic and thoroughly practical treatise.

THE MEMOIRS OF HEINRICH HEINE, and some Newly-discovered Fragments of his Writings, with an Introductory Essay, by THOMAS W. EVANS, M.D. London: George Bell & Sons, 1884.

These memoirs of the great German lyric poet will be read with interest wherever his extraordinary genius has been recognized. Dr. Evans, in giving to the public this volume, has, in his introductory essay on the life and works of Heine, sought to relieve his fame from unjust judgments, and his character from false imputations. His analysis of the man who has been so severely criticized shows him to have been not only endowed with brilliant powers of mind, but to have manifested purity of purpose and faithfulness to his convictions.

Dr. Evans is to be congratulated on this manly tribute to a manly man.

BEECHER'S MANUAL AND DENTAL DIRECTORY OF THE UNITED STATES. M. P. BEECHER, Editor and Compiler. New York: Beecher & Co., 1884.

We are in receipt of a copy of the above book, an octavo volume of 163 pages. The author claims that he has endeavored to make a compilation of facts and general information of interest to dentists, comprising "a manual and book of reference for the use of the dental profession, with a directory of dentists and a classified list of manufacturers and dealers in dental supplies and appurtenances of every description."

PAMPHLETS RECEIVED.

DEVELOPMENT of Enamel Similar to other Epidermoid Structures. By M. H. Cryer, M.D., D.D.S. Read before the Odontographic Society of Pennsylvania, June, 1884. Philadelphia: Wm. H. Hoskins, 1884.

FERMENTATION in the Human Mouth: Its Relation to Caries of the Teeth. By Dr. W. D. Miller, Berlin, Germany. Reprinted from the "Independent Practitioner." New York: Dental Journal Association, 1884. Price, 50 cents.

THE Origin of Defective Enamel, by Prof. W. H. Eames, D.D.S., St. Louis, Mo., with Opening Discussion by Prof. L. C. Ingersoll, D.D.S., Keokuk, Iowa. Read before the Illinois State Dental Society, at its Twentieth Annual Meeting, Springfield, Ill., May 13, 1884. Reprinted from Transactions of the Society.

TRANSACTIONS of the Illinois State Dental Society, Twentieth Annual Meeting, held at Springfield, Ill., May 13 to 16, 1884. Chicago: Skeen & Stuart Stationery Co., 1884.

TRANSACTIONS of the Quarter-Centennial Session of the Indiana State Dental Association, at Indianapolis, Tuesday, Wednesday, and Thursday, June 26, 27, and 28, 1883. Indianapolis: Frank H. Smith, 1884.

FROM the Department of the Interior, Bureau of Education, Washington, D. C., we have received the following Circulars of Information: "The Teaching, Practice, and Literature of Shorthand, by Julius Ensign Rockwell, stenographer." "Illiteracy in the United States in 1870 and 1880, with Diagrams and Observations, by Charles Warren, M. D.; with an Appendix on National Aid to Education, by J. L. M. Curry, LL. D., General Agent of the Peabody Education Fund." "Preliminary Circular Respecting the Exhibition of Education at the World's Industrial and Cotton Centennial Exhibition," to be opened at New Orleans December 1, 1884. "Report of the Director of the American School of Classical Studies at Athens for the Year 1882–83."

OBITUARY.

DR. WILLIAM S. CHANDLER.

DIED, at New Orleans, La., Friday, July 18, 1884, of dysentery, WILLIAM S. CHANDLER, D. D. S., in the seventy-fourth year of his age.

Dr. Chandler was born in Hopkinton, N. H. In his younger days he held a clerkship in a large dry-goods house in New York City, but went to New Orleans forty-four years ago and became associated with Drs. Knapp, of that city, in the practice of dentistry. He subsequently graduated at the Ohio College of Dental Surgery, after which he practiced his profession in Port Gibson and Natchez, Miss. For many years he has enjoyed an extensive clientage in New Orleans.

Dr. Chandler was prominent in the organization of the Southern Dental Association. During the years 1868 and 1869 he was a professor in the New Orleans Dental College. He was a leading member of the New Orleans Odontological Society, and its president for two successive terms. He had the reputation of being a skillful dentist, and an upright, genial gentleman.

HINTS AND QUERIES.

On the application of arsenious acid, is the death of the pulp of a tooth produced by absorption or by strangulation?—X.

To the Editor of the Dental Cosmos:

In the August (1884) number of the Dental Cosmos I notice a query from F. H. S. in reference to "intercostal neuralgia." I feel particularly interested in this subject, being myself a great sufferer. Now that I see others in the profession are thus afflicted, I hope some one may be able to explain its cause, and if it has any relation to our vocation. F. H. S. asks "if it may not be superinduced by the constrained position the dentist is frequently obliged to occupy while operating on the under surfaces of upper front teeth." My experience is that, in my case, the immediate cause of an attack is "cold." I cannot remember of ever having an attack of it without its having been preceded by "taking cold." But is there a predisposition to it in practitioners of dentistry? —G. W. T.

Question.—If it is thought best to lose the four sixth-year molars, should they be extracted all at one time? If not, why?—N.

Answer No. 1.—If the four sixth-year molars are to be extracted, and the teeth are fairly regular and the occlusion good, the lower teeth should be extracted from ten months to a year sooner than the upper. Otherwise, as the tendency of developing teeth is to move forward, and the upper teeth move much faster than the lower, the upper teeth will in many instances be in contact while the lower bicuspids and molars are still far apart, permanently preventing a good occlusion.—B.

Answer No. 2.—This is the query of some quizzical quidnunc, or some innocent novice who is in the fog and has no "fog-horn" or "electric light" to mark his whereabouts. *Unsoundness* is the only "why" for extracting the first permanent molar! If only one is unsound beyond repair, extract only that one; but be sure to have a substitute ready to take its place immediately, for obvious reasons! "If it is *thought*" reveals the superficiality of the question. *Thought* should read "decided!" Thoughts lead to decisions, but are never finalities of mentation. The only characteristic difference between the "variable portions" of the maxillæ is in their manner of attachment to the "permanent portions" of the same. The attachment of the inner alveolar plates of the superior maxilla is so intimate with the transverse plate and its curving into the alveolar border, that it is difficult to determine just where the vertical portion becomes "transverse." In the lower jaw the "permanent" portion is more clearly defined, and constitutes the whole curve of the base of the bone. This portion does not change, even after extraction of all the teeth, but very slowly by functional, surgical, or accidental pressure being brought to bear upon it. "Circumstances alter cases" is a strong factor in settling the decision to extract at once or by piecemeal. Usually it is well to extract upper and under of one side, allowing the patient to use the other until healing tolerates chewing on that side, and then proceed to extract on the other side. But this method is to be commended only where no substitutes are contemplated.—A. H. W.

To Prevent Grating the Teeth During Sleep.—In answer to W. J. B., I would say that a rubber plate, made thin and covering the molars and bicuspids above, and used during the night, has proven very efficient in my practice.—Walter Stuart, D.D.S.

Amalgam Practice.—Like most graduates in dentistry of an early date, I was educated to ignore and condemn the use of amalgam. For several years I respected the prevailing prejudice; then determined to experiment with amalgam, and soon discovered that it possessed merit as a material for filling teeth, if rightly used.

For more than twenty-eight years I have used amalgam in my practice, and have freely advised others to use it, but never as a *second-class* filling. It is the abuse of amalgam that has created so wide-spread a prejudice against the use of it. If we will use amalgam when indicated, honestly and faithfully, much of the existing prejudice will abate, and many teeth now extracted would be preserved in comfort for years.

Like gold foil, almost any of the amalgams on the market at the present day can be used to advantage in skillful hands, and especially by that class of operators who regard and use it as a first-class material. There is more in the right manipulation of amalgam than in the manufacture of it; so with gold and with every material used for filling teeth.

I am eclectic both in theory and practice,—try all things favorably recommended, and hold fast to that which proves good. In my hands amalgam has given satisfaction to patrons and operator, and I hold that what one man has accomplished others can, if they will.

It has been my privilege recently to inspect amalgam fillings which I inserted for two patients more than twenty-eight years ago (males about fourteen years of age), the first being a very large filling in a right superior first molar, with nearly half the crown gone, and the decay running well under the margin of the gum. The sensitive dentine at the base of the cavity was protected by a pad of asbestos, enveloped in tin-foil (my practice of that day; I now use other preparations). The filling was contoured to the original shape of the tooth, dressed smoothly, and burnished, and the patient dismissed. The tooth has retained a natural color; the gums are perfectly healthy, and the filling is as smooth and bright as it was the day it was inserted. The second patient wears six amalgam fillings in approximal cavities of the lower front teeth. The fillings are all perfect; the teeth retain their natural color, and give no trouble. Can more be claimed for gold, or for any other material now used for filling teeth?

I occasionally meet with patients of former days wearing amalgam fillings that I inserted more than a quarter of a century ago, and they are satisfied, and ought to be, for their teeth have been well preserved during many years of rough usage.

With such experience, I feel justified in the free use of amalgam, and fully authorized to recommend it as a valuable material for filling teeth,—not as a substitute for something better, but as the very best material that can be used under some circumstances, and consequently (in my judgment) a first-class material; second to none.

My mode of practice is to prepare cavities thoroughly as for gold or any other material; to always counter-sink or bevel the edges of the cavity, and saturate the base and walls of the same with creasote, and, if the cavity is deep and the dentine sensitive, I place some non-conducting material on the base; then insert the amalgam, in squares or pellets to suit the cavity, with rough-faced amalgam pluggers, and manipulate and condense firmly from the base to the surface with smooth-faced pluggers, shaped suitably for the respective cavities. Heavy pressure brings to the surface any excess of mercury, to which I instantly apply crimped pellets or pads of tin-foil, with steady, forcible pressure with rough-faced pluggers,—the surest and best means of removing any excess of mercury. I then use pulverized pumice with a soft pine stick, wedge-shaped or otherwise as indicated, to smooth the surface and margin of the filling within the outer line of the countersink, while in a semi-soft state; then, after the lapse of several hours, I apply a stick of orange-wood or hickory (shaped to suit) and pumice forcibly to the surface of the filling until smooth; then burnish the same as I do gold fillings. The patient is satisfied, and so am I.

Gold is most attractive and pleasing to the eye, but amalgam will best preserve some teeth, and can be successfully used when and where gold cannot.

That there is merit in amalgam none can doubt but the prejudiced and ignorant,—not ignorant as to the general principles of the practice of dentistry, but ignorant as to the true worth and best mode of manipulating amalgam for the preservation of teeth. Let us discard prejudice, and experiment with an earnest zeal for success in the use of any material, and we will be profited and strengthened in our ability to render more efficient service as practitioners of dentistry.—B. F. ARRINGTON, *Goldsboro, N. C.*

TO THE EDITOR OF THE DENTAL COSMOS:

IN the June (1884) number of the DENTAL COSMOS appeared the law recently passed by the Maryland Legislature "to provide for the better education of dentists," etc. The first section of this law reads as follows:

"Be it enacted, by the General Assembly of Maryland, that it shall be unlawful for any person who is not, at the time of the passage of this act, engaged in the practice of dentistry in this State, to practice dentistry, unless he or she shall have obtained a certificate as hereinafter provided, or shall hold a diploma from a university or college *chartered by or under the laws of this State*" (Italics mine), "authorized to grant diplomas in dental surgery."

The injustice, the maliciousness of this law is that all dentists, graduates of dental colleges, not in the State of Maryland, are prohibited to practice here without being previously examined by the Board of Dental Examiners as "to their knowledge and skill in dental surgery." With all due respect for the Maryland dental colleges, I assert that there are probably a dozen other dental schools whose diplomas attest to as high qualification as theirs, and that this discrimination in their favor is entirely uncalled for. I do not entertain the idea that any gentleman connected with either of the faculties of the Baltimore schools was influential in the passage of such a law as this. It is certainly a monstrous piece of impudence to condemn the dental colleges outside of Maryland in this wholesale way.

Dr. Edward Nelson, of Frederick, a member of the examining board, assures me that this objectionable feature did not appear in the original draft of the bill, but it is so carefully worded that I cannot help but think that it was subsequently designed by some one to pass as it now stands.

This law has probably so far escaped the notice of our reputable dental colleges, or it would ere this have called forth their indignant protest. An apology for and amendment of the law is certainly due from the author of it.—EDWIN BERGSTRESSER, D.D.S., *Hagerstown, Md.*

BRIDGE-WORK.—One of the worst frauds ever perpetrated upon the public by dentists is that known as "teeth without plates" or "bridge-work." In the first place, the "patent" could never be successfully maintained, for the principle is almost as old as dentistry. Between thirty and forty years ago I saw work made by English dentists upon this same plan; saw cases which had been removed from the mouth, and about as disgusting as one could imagine, coming from the mouth of a human being. I have had occasion recently to remove such from the mouth which had been there but a few months, and their condition was sickening.

The objections are these: When attached to the natural teeth, and not roots, a gold band is made to inclose the entire tooth; when this is finally adjusted it is put on with cement; this cement will eventually work loose, disintegrate, and come out; there will, at least, be space for the secretions, and these will cause decay, and the sound tooth become *girdled with decay.* Then the hanging of artificial teeth solidly to a natural tooth will, from use, *loosen it* permanently. Last, though not least, between the teeth and plate and the gums there will be secretions of food and mucus, which can by no means be removed, and thus the denture, however small, becomes a constant source of foul breath, abhorent to any person of cleanly habits.

Now, for a dentist to deliberately put such a denture in the mouth, and not inform his patient of these facts, is a fraud. There are occasional cases, but rare, when such an appliance would be admissible. On the other hand, a well-fitting plate, properly articulated, is not objectionable; is serviceable, and can always be kept clean, and no harm comes to the natural teeth, even when clasped to, provided the clasps are properly adjusted and kept clean.—L. P. HASKELL, Chicago.

THE severe pain which often accompanies the application of arsenious acid for the destruction of the dental pulp may be almost entirely obviated by the application of a little chloroform on a pellet of cotton before the "nerve paste" is applied, allowing it to remain a few seconds, and immediately stopping, thus preventing a rapid evaporation. I have never known a tooth to ache when carefully treated in this manner.—A. A. WILCOX, Cleveland, Ohio.

TO THE EDITOR OF THE DENTAL COSMOS:

In the last number of the DENTAL COSMOS, on page 470, the following errors occur—clerical, of course—in Dr. Niles's paper. In describing the submaxillary gland, he is made to say that "the veins are supplied from the submaxillary ganglion," etc., instead of the *nerves.* Again, "the ducts of the submaxillary gland vary from ten to twenty in number," which should read the ducts of the *sublingual.* Bartholin should be *Bartholine* (Gray). [The dictionaries of Dunglison and Thomas give the former spelling of Bartholin.—ED. DENTAL COSMOS.]—W. J. HEWES, D.D.S.

THE

DENTAL COSMOS.

VOL. XXVI. PHILADELPHIA, OCTOBER, 1884. No. 10.

ORIGINAL COMMUNICATIONS.

DENTO-EMBRYONAL HISTOLOGY AND TECHNOLOGY.*

BY W. XAVIER SUDDUTH, D.D.S.,

DEMONSTRATOR OF HISTOLOGY IN PHILADELPHIA DENTAL COLLEGE.

THE study of the minute anatomy of tissues, by the aid of the microscope, is to-day an established branch in the curriculum of nearly all medical colleges, and should be in all dental colleges. We have made grand advances during the past ten years; let us make the next decade grander still. We constantly hear the complaint from dentists of their non-recognition by the medical profession. Gentlemen, the fault lies in ourselves. Let us prove ourselves worthy of recognition, and it will be accorded without reserve. What we of the D.D.S. need is more D.D.S. One of the essentials for successful practice is a thorough knowledge of the tissues which we are called upon to treat. It is my aim in this paper to give some of the methods of obtaining and preparing tissues especially pertaining to dental anatomy, and an interpretation of what they will show, with the view of interesting the members of the profession in a subject which every one who cares to be well or even fairly posted should be familiar with in an experimental way.

The methods of hardening, cutting, staining, and mounting that tissues must go through before they are ready for examination seem tedious at first; but when we understand the why and wherefore they are simple enough, and we follow the regular routine as a matter of course. In regard to the expense, the beginner does not require a very extensive list of apparatus; as he advances in his knowledge he can add, little by little, and thereby not feel the additional outlay; the greatest outlay being in the higher-power objectives for finer histological study. Low powers and topographical studies are best suited for the tyro in microscopy, and are not expensive.

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*Read before the Illinois State Dental Society, at Springfield, May 15, 1884.

As regards reagents and stains, the fewer and simpler that obtain a given result the better. Leave complicated processes and staining to more mature years. Fifty dollars will cover the outlay necessary to demonstrate the development of the teeth in the most practical manner. I would advise the purchase of a cheap microscope, as you will find that, by the time you have learned to properly use your instrument, it will not be worth very much, and the same would hold true of a more expensive one.

There are a great many hardening fluids, but for our needs a one per cent. solution of chromic acid is best. It decalcifies as well as hardens. This is made by adding thirty grains of chromic acid to a quart of water. The tissues (as fresh as possible) should be put into the solution and the fluid changed every other day for one week; then left until completely decalcified. They are then to be placed in a seventy-five per cent. alcohol to remove the chromic acid. This should be changed as often as it becomes cloudy. Tissues can be prepared in this manner in quantity, and kept in alcohol until needed.

For the demonstration of the development of teeth, I have found fetal pigs the most readily obtained in good condition. A series of these should be secured, ranging in length from one inch to six inches; the first presenting the beginning of the development of the teeth, and the last being as large as practicable for study in the pig. For sections of fully-developed teeth, young kittens or rabbits are best adapted. To prepare the material, disarticulate the inferior maxillæ, and place each in a separate bottle filled with one per cent. solution of chromic acid; suspend the jaw in the fluid by means of a string; label, cork, and put away. After the jaws are completely decalcified, which can be ascertained by trying to pierce them with a needle, they may be imbedded in one of three ways: First, they may be placed between pieces of hog's liver, previously hardened in alcohol, and thin sections cut with a razor, ground flat on one side. Very good sections can thus be made. Second, make a thin mucilage by dissolving picked gum-acacia in warm water; place the tissues in water for twelve hours, then put them in the mucilage over night; remove and place in alcohol to precipitate the gum; hold between pieces of liver and make sections. This method keeps the parts *in situ* fairly well, which is of great advantage in the study of the development of the teeth. The disadvantage is that the sections must be placed in water to remove the gum before staining, with consequent risk of displacing parts. They can be mounted in glycerin, and studied without other staining than that which they have received from the chromic acid. These, however, do not make good, permanent specimens. Third, a new method of imbedding has lately been given to the profession by Scheiferdecker, that has very greatly added to the advance of microscopical technique, viz., celloidin. Celloidin is a perfectly pure preparation of pyroxyline. The best method of preparing this imbedding mass consists in making a saturated solution of celloidin in equal parts ether and alcohol. The decalcified specimen is first placed in equal parts ether and alcohol for twenty-four hours; then soaked for the same length of time in the celloidin, so as to thoroughly penetrate the tissues with the celloidin; next, make a small paper box, in which place the specimen and cover with thick celloidin solution; then place under a bell-glass, raised slightly from the table, and leave over night. The imbedding mass will shrink very considerably, for which allowance must be made in size of box and quantity of mixture used. The shrinkage is due to the evaporation of the ether and alcohol. When the mass is sufficiently hardened, which will require a longer or a shorter time according to the size of the mass, place in a mixture of equal parts alcohol and water to harden; then remove the paper box, and cut sections with a flat razor dipped in equal parts alcohol and water; float the sections off on the same fluid. Strong alcohol must not be used, as it softens the mass. The sections may be kept in a bottle, filled with equal parts of water and alcohol, until needed for use.

A word in regard to section-cutting may not be amiss. Besides the flat razor, which will do for all ordinary work, there are several microtomes in use, the best of which is Thoma's. This microtome is capable of cutting sections .001 of a mm. in thickness; the thinnest known are .002 mm. The inclination of the oblique plane upon which the object-holder slides is 1 in 20, consequently the section will be $\frac{1}{20}$ of a mm. thick when the carrier is moved one mm. on the oblique plane. Every revolution of the carrier-screw pushes the object-holder .03 mm. The periphery of the carrier-screw is divided into 15 parts. Turning the screw one of these parts makes a section .001 mm. thick; most of my sections are .015 to .025 mm. thick, or from $\frac{1}{1000}$ to $\frac{1}{1600}$ of an inch. Having cut our sections, we are ready for the staining and mounting process.

If it is desired to mount in balsam, which I consider the best for permanent tooth preparations, either one of two methods may be used: First, the dehydrated stained specimens may be placed in a dish containing oil of cloves, and the celloidin removed, after which they may be mounted in the usual manner. Second, the unstained sections may be placed on the slide on which there has previously been dropped a sufficient quantity of oil of cloves to fix but not to float the section, after which it may be stained on the slide, dehydrated, and mounted in the usual way. The latter is especially applicable to very large, thin sections, as it obviates the necessity of rehandling.

I have found that embryonal tissues do not permit of very elaborate and complicated staining methods. The brilliancy of the result depends on a combination of different tissues with their different chemical reactions. These are found only in mature tissues, especially in the lower order of animals. The best result I have obtained has been in sections of the head of the newt and common snake. For the demonstration of the teeth, only four stains are requisite, viz.: Hæmatoxylon or logwood, eosin, picro-carmine, and methyl-green, valuable in the order named; or as double-stains in combinations of hæmatoxylon and eosin, hæmatoxylon and picro-carmine, eosin and methyl-green, and picro-carmine and methyl-green. Double-stains give the best results. Tissues that have been hardened in chromic acid require to be placed in a one per cent. solution of carbonate of soda from fifteen to twenty minutes, to remove the chromic acid. To double-stain sections thus prepared with hæmatoxylon and eosin, which is by far the best double-stain for general use, add ten drops of hæmatoxylon to a watch-glass of distilled water, place the sections in it, and let them remain one or two minutes, or until they assume a light straw color; thoroughly wash in ordinary water and place in the eosin-stain. Dehydration and eosin staining can both be accomplished at the same time; a matter of considerable importance, if you intend to mount in balsam. To do this, keep on hand a saturated solution of eosin in absolute alcohol. When a stain is wanted, add a few drops of this solution to a watch-glass of ordinary alcohol. Having stained the tissues, rinse in absolute alcohol, and place on the slide; with a camel's-hair brush or pipette drop several drops of oil of cloves on the section; set aside and allow to clear up, which will require several minutes. Examine, from time to time, under the microscope without placing the cover-glass. When sufficiently clear remove the surplus oil of cloves, and drop on the section sufficient balsam, thinned with chloroform, to cover the section; then place the cover-glass and put aside for the balsam to harden.

For the other double-stainings, place several sections in a one-half per cent. solution of picro-carmine, made after the following formula:* Carmine, 1 gramme; liquor ammonia, 4 c. cm.; water, 200 grammes; mix and add 5 grammes picric acid; shake thoroughly. After settling, draw off so as to leave the undissolved picric acid behind. Evaporate in a shallow dish in open air. A red powder is thus obtained, with which a one-half per cent. solution with distilled water is to be made, and allowed to stand several days, when it can be filtered and is ready for use. Sections should be allowed to remain in this solution at least twenty minutes; longer does not matter. When sufficiently stained, remove to a watch-glass of distilled water, which has previously been acidulated by adding a few drops of acetic acid; this brings out the color and fixes it. To double-stain these sections with *hæmatoxylon*, place in dilute hæmatoxylon for a few minutes; wash in water; dehydrate in alcohol; place on slide; clear up with oil of cloves, and mount in balsam. To double-stain with *methyl-green*, take the sections previously stained in picro-carmine and place them in a one per cent. solution of methyl-green in alcohol and water (10 parts alcohol, 90 parts water) for several minutes; this will over-stain. Next, place in absolute alcohol, which will remove the excess of green. When the right shade is procured, which can be ascertained by trial, place on the slide, add oil of cloves to clear up, and then mount.

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* Frey.

Fig. 1.

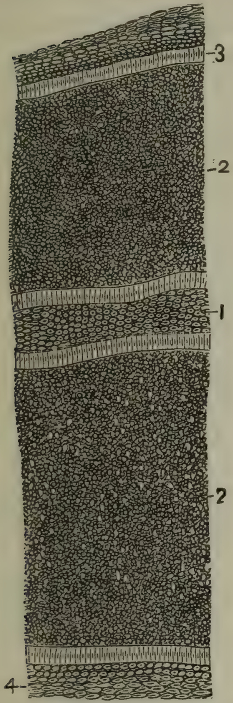


Fig. 1. Portion of a horizontal transverse section of the band. Pig, 2½ centimeters. 1. Band. 2-2. Embryonal tissue of jaw. 3. Labial layer of epithelium. 4. Lingual layer of epithelium.

Fig. 2.

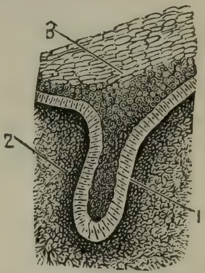


Fig. 2. Vertical transverse section of band. Pig, 2½ centimeters. 1. Band, V-shaped, filled with small, round cells. 2. Embryonal tissue. 3. Epithelium of mouth.

To double-stain with eosin and green, first stain with eosin, and then wash with water, to which has been added a few drops of hydrochloric acid—this fixes the stain; then over-stain in green, decolorize in alcohol, place on the slide, add oil of cloves to clear, then mount.

Note.—These figures are magnified 80 diameters, unless otherwise stated. R. & J. Beck, obj. ⅔. The first six are to be studied in pairs. Fig. 1 is a horizontal cross-section of Fig. 2; Fig. 4 is a horizontal cross-section of Fig. 3 at the deepest portion of the indented band. Nos. 1 and 2, Fig. 4, are the edges of the indented band in Fig. 3, No. 2. No. 2 develops into the lamina. Fig. 6 is a vertical cross-section of the band and one cord, as seen in Fig. 5, No. 2.

Having thus obtained, stained, and mounted a series of specimens, let us study them and see what they will show, commencing with our smallest fetal pig. 2½ centimeters in length, of which we have made horizontal transverse sections of its inferior maxilla. The first sections remove the surface of the gum and simply show epithelial tissue; but a few sections deeper we find a furrow or band filled with small round cells (Fig. 1, No. 1). The outer sides of this band are composed of cylindrical cells. This band extends the entire length of the jaw; on either side of the band the jaw is made up of embryonal tissue, while on its labial and lingual aspect we find epithelium. Vertical transverse sections of the same-aged fetus show that the band is V-shaped (Fig. 2).

Our next fetus (Fig. 3) is three centimeters long; sections from its inferior jaw cut in a vertical transverse direction, show the band expanded at its deepest extremity by internal proliferation of cells.

FIG. 3.

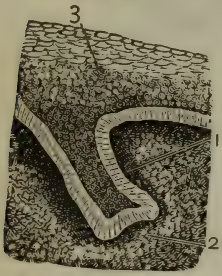


FIG. 3. Vertical transverse section of band of 3-centimeter pig. 1. Band expanded. 2. Indentation at deepest portion of band. 3. Epithelium of mouth.

FIG. 4.

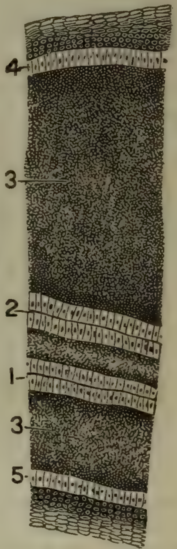


FIG. 4. Portion of horizontal transverse section of band of 3-centimeter pig, at the deepest part of the band. 1. band. 2. Lamina. 3-3. Embryonal tissue of jaw. 4. Lingual layer of epithelium. 5. Labial layer of epithelium.

Just previous to the formation of the cord the band seems to be indented on its deepest surface its entire length (Fig. 3, No. 2), and a lamina formed on its inner side (Fig. 4, No. 2). Horizontal transverse sections through this portion of the band show six lines of epithelial cells, instead of four, as will be seen if made earlier or through a more superficial part of the band.

The space between 1 and 2, Fig. 4, filled with embryonal tissue, corresponds to No. 2 of the previous figure. The indentation having progressed somewhat farther, produces the lamina; and the section being made at the deepest portion, shows the two layers of epithelial cells, which form the lamina in apposition, as also are those of the band. The development thus far has been general, and has reference to the formation of all the temporary teeth.

From the inner side of this lamina, at such intervals as correspond to the position to be occupied by the temporary teeth, small buds shoot out and extend until they become slender cords (Fig. 5, Nos. 2-2).

Vertical transverse sections of the band, in the intervals between the cords, show that the band has shrunk back into its original V-shape (Fig. 2, No. 1), the tension having been apparently relieved by the bursting forth of the cord (Fig. 6, No. 2). Vertical transverse sections from the jaw of a 3½-centimeter pig show the internal development of cells, continuing with unabated energy in the deepest portion of the cord of the inferior central incisors, to which we shall confine ourselves in future descriptions. Vertical transverse sections from the jaw of a 4-centimeter pig (Fig. 7) show very little change.

FIG. 5.

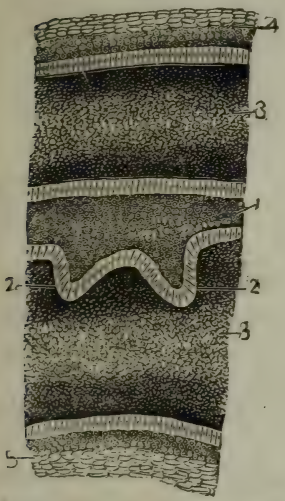


FIG. 5. Horizontal transverse section of jaw of 3½-centimeter pig, in median line, showing cords for two inferior central incisors. 1. Band. 2-2. Cords. 3-3. Embryonal tissue. 4. Labial layer of epithelium. 5. Lingual layer of epithelium.

FIG. 6.

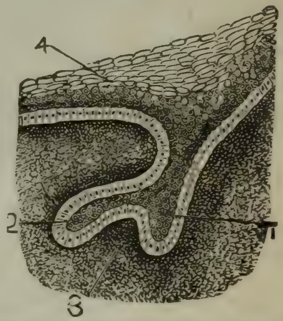


FIG. 6. Vertical transverse section of cord of inferior central incisor, same age fetus as Fig. 5. 1. Band 2. Cord. 3. Embryonal tissue. 4. Epithelium of mouth.

The lower portion of the cord has increased slightly by internal proliferation, and now presents a bulbous appearance, and very much resembles a Mattson syringe with a short nozzle. With these changes it has become more deeply imbedded in the substance of the jaw. At first the cord stood nearly at right angles to the band, but as development progressed it curved in towards the axis of the band, thus assuming a sickle shape.

A horizontal transverse section made of the jaw, at this stage of development, will show a vertical transverse section of the cord lying beside a longitudinal transverse section of the band. Studying sections from the jaw of a 5-centimeter pig (Fig. 8), we notice the bulbous portion of the cord has become flattened at its deepest extremity. This flattening is caused by contact with a new element, viz., the dentinal papilla, which now enters into the future development of the tooth. The papilla or pulp is a growth from the submucous tissue of the jaw; its growth is upward or toward the surface of the jaw, while the growth of the cord has been downward, or into the substance of the jaw. Just how the papilla is formed or why it should come into contact with the cord I am unable to demonstrate. The cord now presents the appearance of a "chip-blower," i. e., is pear-shaped, and shows the beginning of the process of invagination, by which the two tunics are formed.

FIG. 7.

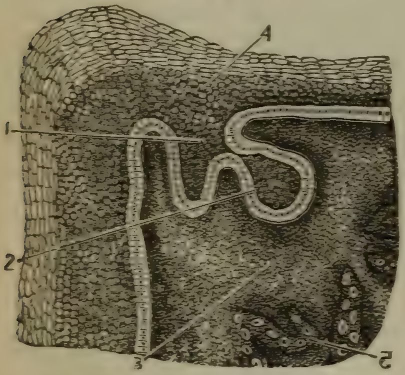


FIG. 7. Vertical transverse section of jaw of 4-centimeter pig. 1. Band. 2. Bulbous cord, filled with small round cells. 3. Embryonal tissue. 4. Epithelium of mouth. 5. Ossifying cartilage.

FIG. 8.

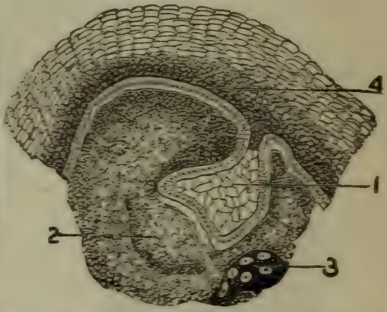


FIG. 8. Vertical transverse section of jaw of 5-centimeter pig. 1. Pear-shaped cord, small round cells, changing into stellate cells. 2. Dentinal papilla. 3. Ossifying cartilage.

A ready illustration of the process of invagination of the bulbous cord is made by taking in one hand a syringe with an egg-shaped bulb, the tube being attached to the small end. Hold the tube between the first and second fingers, the bulb lying in the hand; with the end of the thumb of the same hand press the large end of the bulb until it comes in contact with the small end. In this perfect illustration of the method by which the two tunics are formed, your thumb represents the dentinal papilla filling the concave space in the enamel organ, and the tube represents the neck of the cord which still connects the enamel-organ to the epithelial layer of the mouth.

(To be continued.)

DIFFERENTIAL DIAGNOSIS.

BY CHARLES J. ESSIG, M.D., D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society, July 29, 1884.)

Pain or discomfort in or around a tooth, while usually the first symptom of a deviation from the normal condition, either of the dental pulp or of the surrounding tissues, constituting simply inflammation of either of these parts, may yet be merely sympathetic, and the organ seemingly affected be perfectly sound. The differential diagnosis of the cause of these troubles, therefore, often demands much care and intelligence.

The causes at present recognized of pain in or around the dental organs are not only comparatively numerous, but are often so obscure as to baffle for a time all efforts to find the origin. Even in the apparently simple matter of differentiating between the pain of periostitis and the purely neuralgic pain of an exposed pulp, much difficulty may occasionally be experienced.

I can, perhaps, in no better way illustrate my meaning than by describing a case directly in point, which came under my charge in the early part of the present year. The patient came to me for the first time with great pain in an upper tooth on the right side. She could not definitely locate the pain, other than in a vague sort of a manner, placing the finger over the first right superior molar, with the remark, "It seems to begin here, and extends along towards the temple." In examining the first molar I found it devitalized. Two extensive cavities had been beautifully filled after the most approved contour method, as also some of the neighboring teeth, and so thoroughly had the work been done that I readily assumed that the roots had likewise been carefully treated. There were cicatricial marks on the gum over the tooth, indicating that one or more abscesses had on previous occasions been opened with the lancet, but at the time of the examination there was not the least tenderness on percussion, and no loosening or elongation. In response to my questions, the patient informed me that neither heat nor cold aggravated the pain, but that the recumbent position made it much worse. The fact of the tooth being devitalized, the evidences of previous trouble, and the statement of the patient that the recumbent position "made the whole side of the face throb," induced me, in the hurry of the moment, to treat the case as incipient periostitis, and I simply made an external application of aconite,—getting a promise, however, from the patient to come to me the next morning, which she did, reporting that she had endured intense pain during the night. I now felt fully interested in the case, and determined to find out the cause of the pain, which I began to suspect was not the first molar. To this end I asked the following questions, and it will be observed, by the answers I received, how little we can depend upon the patient in many of these cases in helping us to a correct diagnosis. My first question was: "Does the pain come on after eating?" "No; it may come on at any time." "Do sweets cause the pain?" "No." "You told me that the recumbent position provoked the pain." "Yes; I could not lie down at all last night." "Are you sure that cold does not cause the tooth to ache?" "Yes; I have just eaten water-ice without discomfort."

Yielding to an impulse to test for myself the correctness of this statement, I took up a syringe and threw a jet of not very cold water equally upon the first molar and the second bicuspid. Instantly the patient suffered the most acute pain. There, then, was the trouble. The second bicuspid contained a very large gold contour filling. The absence of redness and swelling, loosening and elongation, was accounted for. The pain was confined to the pulp alone. I at once proceeded to remove the gold filling, which I found to be very securely anchored by a number of retaining pits, one of which was through to the pulp. Through this I introduced the end of a fine exploring instrument, and a small amount of pus came out, followed by a slight bleeding of the pulp. Suppuration had taken place at the point nearest the irritating influence of the gold filling.

In differentiating between the cause of pain under conditions such as I have described, the recurrence of pain when the recumbent position is assumed is of little or no importance, for pain is always increased by that position, whether the inflammation is confined to the pulp or to the periosteum and contiguous parts, though it may, of course, differ in degree. No rule for the differential diagnosis of causes of pain in the dental organs can be relied on. The only kind of instruction of value to the student in this direction is that which is purely clinical. I, of course, refer to cases of which we have no previous history or record.

Even in simpler cases, where the patient can definitely indicate the affected tooth, and where tenderness to percussion, slight loosening, and elongation dispel all doubt as to the seat of the trouble, diagnostic care is still necessary to the success of the treatment to be pursued, particularly when the previous history of the tooth is unknown. The first question to decide in such a case is: Has the dead pulp been removed, and have the canals been thoroughly filled? Secondly: Which of the roots is affected? I can illustrate my meaning again by citing a case which I was called upon to relieve a few Sundays ago. The tooth, a first superior molar, had been exceedingly painful for forty-eight hours. It was sufficiently raised in its socket to make premature contact with the opposing teeth, and was slightly tilted towards the cheek; which assured me that the trouble was at the usual place—the palatal-root. This tooth contained a large gold filling. I drilled through this towards the affected root, which I found well filled with oxychloride of zinc. After much labor with a very fine drill, I removed this and reached the apical foramen. Pus followed the withdrawal of the drill, and after that quite a free flow of blood, with prompt relief to the patient; although not infrequently the pain is intensified for a short time after the sudden removal of the pressure. The points of diagnostic value in this case were, first, the direction in which the tooth was tilted, indicating the exact seat of the lesion; and, secondly, the slight elastic movement of the tooth when pressed, showing that pus had formed, and necessitating the opening of the canal. It is in incipient cases such as this that, by careful diagnosis, we may save the tooth and prevent many days of suffering to the patient.

We may also meet with complications of a much more puzzling character than those I have described. I recently saw such a case in a mouth which had received no attention since the death of the patient's previous dentist, which occurred ten years ago. There was great pain in the left inferior second or third molar. It required no little care to arrive at the conclusion that the pulp in the wisdom tooth was slightly exposed and fully alive, and that the pulp in the second molar had long been dead; and the violet-colored nodule which was seen partly projecting through an opening from the pulp-chamber was gum-tissue, and not pulp. It may be remarked that the difference in sensibility between the two might have settled the question; but, so far as response to contact with the instrument went, the patient did not seem to be able to distinguish between the two. Now, did I apply arsenic? No. The hypertrophied appearance of one made me uncertain. As to the wisdom tooth, my mind was made up. To it I applied equal parts of oil of cloves and carbolic acid; to the second molar, carbolic acid alone. At the second visit I had no difficulty in determining that the source of pain had been in the wisdom tooth. It is needless to say that the hasty or careless use of arsenic at the time of the first examination might have resulted in another suit for damages.

Another case occurs to me which even more forcibly illustrates the difficulty of diagnosis. The patient suffered from great pain, swelling, and elongation of the left first inferior molar, and a small circumscribed abscess over the right superior cuspid. Neither of the teeth was decayed, but both were affected by pyorrhea alveolaris. Aware that small circumscribed abscesses often occur during the progress of that disease without the pulp being involved, and that, in other instances, the sinus or pocket which forms along the tooth may by its encroachment cause the death of the pulp and the usual and more diffused abscess, the chief point of diagnostic value was to determine which condition we had to deal with, as the treatment would depend entirely upon the diagnosis. According to the patient's account, the molar had been sensitive to cold for a long time, and had been so tender that it was practically useless. The cuspid had never been painful or tender, either to cold or when used. I inferred that the pulp of the molar had died, and we had the usual form of alveolar abscess to deal with, and that the cuspid was affected merely by one of the abscesses almost characteristic of pyorrhea alveolaris. Applications of ice-cold water confirmed the diagnosis. The treatment in each case was simple enough. It consisted in drilling a capillary opening into the pulp chamber of the molar, to allow the escape of pus, or mephitic gas, while the small abscess in the cuspid, which was located just above the margin of the gum, was opened and treated with a solution of chloride of zinc. In both cases relief was very prompt. It is needless to say that what would have been correct treatment for one would have been highly improper for the other.

Now, it may be urged that the cases I have mentioned here are somewhat unusual. Let us grant at once that such is the fact; but I hold that it is in just such cases that difficulty, if not danger, is to be encountered, and therefore unusual cases demand extraordinary care. I have always believed that in the famous Gardiner case the patient died of pyemia, resulting from an unusually severe alveolar abscess, and if this had been correctly diagnosed and treated in its incipiency the patient's life would have been saved.

Again, four or five years ago a suit for malpractice was instituted against a most worthy and conscientious young member of the profession, whose only fault was in failing to differentiate between periostitis and an exposed pulp. The patient, in the absence of proper treatment, suffered a severe alveolar abscess, necrosis of the process, and the loss of several neighboring teeth, and it was all his friends could do to save the young gentleman from being mulcted in heavy damages.

Alveolar abscess does now and then terminate fatally, and it is very frequently attended with alarming symptoms, and always with much suffering and depression; yet when recognized and treated in its incipiency it is not difficult to manage.

OPERATIVE DENTISTRY: GENERAL PRINCIPLES AND SPECIAL POINTS.

BY A. G. BENNETT, D.D.S., PHILADELPHIA, PA.

(Read before the Pennsylvania State Dental Society, at Wilkesbarre, July 30, 1884.)

Though preparing and filling a carious cavity requires strict conformity to certain mechanical principles, the highest obtainable degree of excellence must be based on definite scientific knowledge of the structure and materials involved in the operation. Here minute anatomy, physiology, pathology, and therapeutics must combine their facts and principles, so that this, the most frequent and important operation in dentistry, may be performed in the clearest light of dental science.

The most important lesson that anatomy teaches in regard to the structure of enamel is, that it divides most readily between the rods or columns, which stand at various but regular angles to the surface of the dentine. The subject of enamel cleavage occupies a small space in dental literature—a paper by Dr. Line being the only one known to me. In my opinion, it has not received the attention its importance demands. It is not possible in all positions to divide the enamel between the rods; but the walls should be so beveled as to conform as nearly as possible to their directions. It is sufficiently accurate for our purpose to state that the enamel columns lean towards a small and from a large crown cavity, and that, on any other surface of the tooth, the larger the cavity the more the rods diverge; so that, if the cavity wall be beveled almost to the thickness of the enamel and at an angle of from twenty-five to thirty-five degrees, according to the size of the cavity, we shall conform as nearly as it is usually possible to the line of cleavage. All operators have doubtless observed that the softer and more brittle the enamel, the more readily it divides; and it may be added that the greater is the necessity for conforming to the directions of the rods. I think all close observers will agree that the chief cause for the broken-down conditions of enamel walls around fillings is the neglect of this important point in preparing cavities.

Enamel is best divided with the chisel, which must be sharp and used carefully, or the rods will be crushed or broken. When cleavage is not available, the final cutting, at least, should be done in the smaller cavities with sharp burs, and in the larger cavities with corundum points. The enamel, as well as the dentine, along the cervical wall not being brittle nor accessible to burs, is best removed with an excavator, of which I will speak again. All accessible enamel walls should be polished with emery tape or fine corundum points. Other things being equal, a polished surface will give the closest possible joint between the filling and tooth-structure. The various sciences which form the basis of operative dentistry teach that about one-fourth of the dentine is organic; that, having circulation and vitality, it is nourished and recuperated in some degree like other vital structures; that it has fibers of living matter which are subject to inflammation; that its lime-salts are removed by certain acids, which generally result from fermentation in the oral cavity; that its carious and softened portions are pervaded by micro-organisms; and that, when the pulp dies, the organic portion of the dentine loses its vitality.

On these facts are based the reasons for topical treatment with anesthetics, escharotics, alkalies, antiseptics, and disinfectants. As regards vital teeth, the softer and more sensitive they are the greater the necessity for treating them with the remedies indicated, and also the greater the benefit in protecting the dentine surface of the cavity from the irritation of metallic fillings with some non-conducting substance. Some writers claim that gutta-percha, being of vegetable origin, and therefore more closely allied to tooth-structure than any substance of mineral origin, is the best lining for all cavities, as well as the best filling for all soft teeth; yet, as some degree of irritation is necessary to the production of secondary dentine, the preparations of zinc, being somewhat irritating as well as antiseptic, promote calcification and recalcification of the dentine more decidedly than gutta-percha, and are, therefore, except in the softest teeth, and when not too near the pulp, the best for temporary fillings and for filling the greater part of all large or deep cavities. The dentine must contain the anchorage for fillings. The general and, I may observe, the correct practice is to groove the dentine near the enamel. As a groove interferes somewhat with the nutrition of the tooth, and often produces discoloration around fillings, it should be as shallow as is consistent with retention of the filling. By using one or two pits a little deeper than the groove to start in, the minimum of shallowness can best be attained. Although a groove is a necessary evil, it has, according to some experiments of mine, at least one compensating property,—when properly made and solidly filled, the gold is more or less wedged into it, thereby producing a joint as nearly perfect as can be made, and giving the dentine the best possible protection against external moisture.

We are all well aware of the long-felt want of a material which has, in the highest degree, all the essential qualities for arresting caries and restoring the lost tissues. If we had a cement so tough and hard and adhesive that it would not only replace the carious dentine and adhere to the cavity walls, but serve as a secure anchorage for gold, which would simply replace the enamel, then we could wait awhile for the ideal material. But gold still seems destined to maintain its position among filling materials. According to many, it has some qualities which often compromise the standing of the dental fraternity. These qualities, however, appear only under improper treatment. Gold becomes harsh and obstinate under too much heating and hammering. In trying to account for its tendency to draw away from the cavity walls, it is strange that some one has not struck the idea that between a live-blow mallet and elastic tooth-bone such a tendency might be expected to appear. Yet it seems to me that a light dead-blow mallet gives the best results. All will admit that gold is used in the best possible manner when the greatest degree of cohesiveness is combined with the greatest softness. All that has been said about keeping gold in good condition can be stated in one sentence,—keep the surface clean. When protected from gases and moisture, it will weld without heating, simply because it does not oxidize. Yet so difficult is it to keep the surface clean, that some degree of heat is necessary to obtain the best results. As is well known, ammonia best protects gold from atmospheric contamination.

In regard to pluggers, it is needless to remark that almost any size and shape of cavity and bevel of border can be filled with an ordinary round plugger. The question is, What curve of shaft and form of surface is the best for packing gold into the cavity and around its margin? It has been said that gold will spread only under a smooth convex surface,—a surface that, besides being favorable to slipping, does not give us the full benefit of the cohesive property. But I think it can easily be demonstrated that gold will spread slightly under a convex surface that is serrated transversely; but if serrated in both directions the spreading is more or less problematical. In my opinion, the best surface for all mallet pluggers, especially those of the foot-shape, is not one of extreme convexity or flatness, but slightly convex, of oval shape, and with fine or medium serrations. The oval shape conforms to that of most cavities, and with a slightly convex surface uniform density is more easily and certainly attained; and for general use, especially for filling between the front teeth, a tapering foot-plugger, bent at an angle of about forty-five degrees, with serrations projecting toward the end to prevent slipping, and a plugging surface on the point for hand-pressure, is the most useful kind of plugger I have tried.

As those who have tried the experiments can testify, the sides of a gold filling are not always as smooth as the cavity walls against which it rests, showing the filling to be defective just where it should be most perfect; and experiments further prove that it is difficult, if not impossible, to make a joint that will perfectly exclude all moisture. Excavating with the oral fluids entirely shut out shows clearly that all dentine is not as dry as dust; and the moisture around a filling in a soft tooth may be entirely from within, and its presence is not due to defective manipulation.

This survey of operative dentistry would be incomplete without some allusion to the treatment of approximal surfaces of bicuspids and molars. Nor can we touch on the subject and ignore the systems that have been practiced for the preservation of these teeth. On these surfaces we have defective enamel which is most exposed to the action of acids and least benefited by the wear of mastication. Because contact permits retention of food and stagnation ot oral fluids, and favors decay, the approximal surfaces are separated; and because contact favors decay and the natural shape of the tooth is best, the teeth are first separated and their original outlines restored by filling. Contour is separation made permanent.

It is a truism that teeth are saved by changing the conditions and permanently removing the causes that produced decay. Both systems attempt this, and in some respects both are found wanting. Separation cuts away surface, which contour restores. Separation favors change of position, which contour prevents. Separation exposes the gums to pressure, inflammation, and detachment, while contour gives it entire protection. But contour favors stagnation of the oral fluids,—a condition which greatly favors decay; separation permits their circulation,—a condition which is antagonistic to decay. Contour derives one of its strongest points from separation, while the worst evils of separation are prevented by contour. Separation removes defective enamel and often exposes the dentine, which may or may not be protected by filling; contour, after removing defective enamel and dentine, replaces these tissues by a metallic approximal surface. This metallic surface, if properly formed, is practically indestructible. The weakest part of these fillings, as every dentist knows, is along the cervical wall. When the filling extends above the gum, as it generally should, the cavity is difficult to prepare, fill, and finish. In filling I rely chiefly on the somewhat antiquated matrix, which, among other things, simplifies finishing. One reason why the cervical wall is difficult to prepare is found in the want of a suitable instrument.

I have devised, or, to be more exact, modified an excavator for cutting the cervical wall—an excavator, I may observe, that only needs to be tried to have its merits appear. The angle, size, thickness, and edge of the blade admit of the smoothest and most effective cutting in the smallest possible space, without passing into the cavity or slipping off against the gum. This instrument is a modified spoon excavator, the blade being made thinner and the sides and edge square. By changing the angle of the edge the same instrument can be used to bevel the enamel margin. If this wall is thus prepared and covered with tin, soft gold, or amalgam,—the last being the only reliable material for deep cavities,—and the filling is smoothly finished, we have complied as far as it is possible with the conditions of success in this most difficult and vulnerable point of all fillings.

PROSTHETIC ARTICULATION.

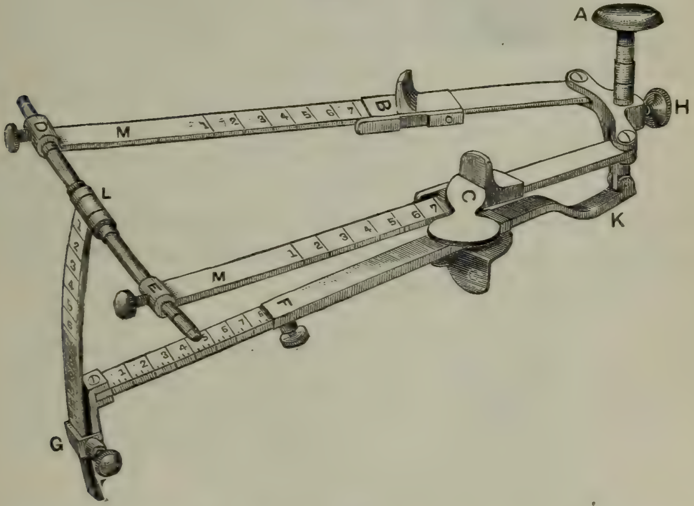
BY H. L. CRUTTENDEN, D.D.S., NORTHFIELD, MINN.

(Abstract of a Paper read before the Minnesota State Dental Association, July 16, 1884.)

In this paper I will endeavor to give my way of operating with a new instrument,—an articulating guide.

After an accurate impression of the mouth has been secured, obtain a correct "bite," at the same sitting, in order to form the articulation, the casts for which are to be set in an adjustable metal articulator. At the same sitting place the articulating guide in the mouth in such a manner that the cap A (Fig. 1) will press up against the hard palate, and the projections B C rest against and outside of the upper gums, at or near the position of the cuspids, with the part L directly in front of the median line. The jaws are then properly closed, and the lower projection on the slide F is placed against the outside of the lower gums, or teeth, as the case may be. When the sliding projections B C are once set at the

FIG. 1.



proper distance on the bars M M to let the cap A press against the center of the hard palate, there is seldom need of changing their position on the bars, except in the case of a very large or small superior maxilla.

The cap A is raised or lowered in the graduated tube to conform it to a high or low palatine arch, and should be so adjusted that, when placed in the mouth, the bars M M will be horizontal, or nearly so. The vertical distance from the upper surfaces of the slides B C to the under surface of the slide F should be the length of the "bite," and such adjustment is effected by raising or lowering the lower bar K at the binding screws G and H, so that K shall be nearly parallel with M M. The operator should stand at the right side of the patient, and, holding the appliance in position with the left hand at C, require the patient to repeatedly open and close the jaws until the several parts shall have been properly and exactly fixed as previously described.

Fig. 2.

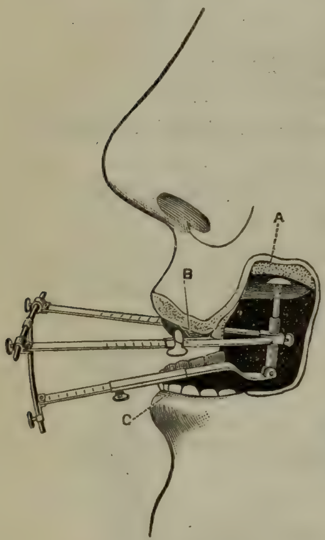


Figure 2 shows the instrument *in situ*.

A record of the measurements may be made to guard against accidental displacement of the parts, or to permit the use of the guide for another case; and Figure 3 is a diagram of such a record.

Fig. 3.

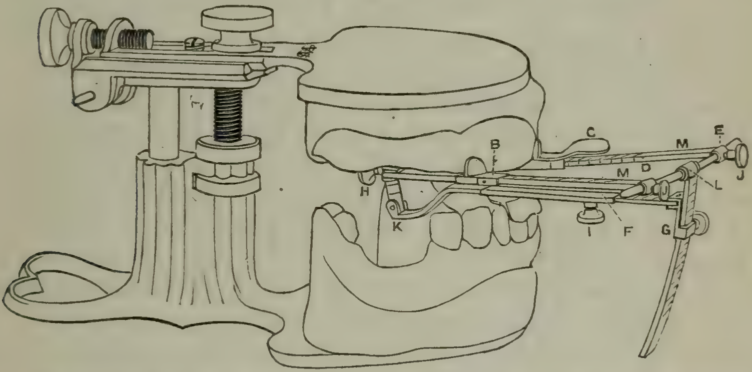
Name..			
$\frac{3.}{1.}$	7.	8.	6¼

The 3 above the line represents the height the cap A is raised out of the graduated tube; 1 is the distance the tube is above the block; 7 is the place at which G is set. (The measurements at D and E are usually at 2; so I never record them unless set at some other mark.) The 8 is the number of the notches the springs on the slides B C rest in, and 6¼ is the exact measurement on the lower graduated bar at F.

Figure 4 shows the guide in place on the articulated models, or casts, and by this means the correctness of the "bite" may be either verified or proven incorrect, and, if the latter, a re-adjustment of the articulator can be made to precisely adapt the relative positions of the models to the exect measurements of the guide. Figure 4, as also Figure 2, shows teeth in the lower jaw; but in cases where those teeth are either partially or completely wanting, the guide will be found equally well adapted for measurement, as previously explained.

When the articulation is tested by the guide, and the cast of the lower jaw does not rest *inside* of the projection on the lower slide (F), it is evident that the patient has, in biting, protruded the jaw as much as the measurement indicates, for the jaw has once been inside the projection, and therefore the guide must be correct, since one cannot close the jaw further back than is natural; yet when found very much out of the way, I would advise a new "bite," if it can be secured.

Fig 4.



The metal articulator should be capable of adjustment in all directions, and I have devised such a one; but it is not perfected in all its parts. Yet I have found it a trustworthy means for articulation in connection with the guide.

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PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION—TWENTY-FOURTH ANNUAL SESSION.

(Continued from page 531.)

Second Day—*Morning Session* (*continued*).

Section VII., Physiology and Etiology, was called, and presented its report through its chairman, Dr. W. C. Barrett, of Buffalo. Before commencing to read, Dr. Barrett passed around a number of glass tubes containing pure cultures of several of the forms of micro-organisms found in the mouth, which, he stated, were made by Dr. W. D. Miller, of Berlin, Germany. Dr. Miller finds the mouth to be the breeding-place of numerous organisms,—not merely those pertaining to diseases of the teeth, but many others which, so far as has been observed, have no part in the disintegration of tooth-structure. Some of these forms cannot be distinguished from one another under the microscope; the only way to tell them apart is by observing their action on the gelatin in the culture-flasks. Dr. Miller has succeeded in segregating five distinct varieties of micro-organisms found in the mouth. These pure cultures are produced by inoculating a suitable medium,—gelatin, etc.,—upon a sterilized gold glass plate, with a minute portion of carious dentine. The proper conditions being supplied, the fungi will develop. If the culture shows more than one species, a second culture-plate is prepared, and a thin platinum wire, sterilized, is dipped into the impure culture and lightly drawn across the gelatin of the second culture-plate, when the fungi which adhered to the wire will be scattered in a row across its surface, and in a short time we shall find different forms developed at different points along the line. If a small portion of the fungi from one of these points be drawn across the surface of a third plate in the manner before described, pure cultures of various species will be obtained in parts of the line made by the wire, and this is then transferred to the gelatin in the tubes.

The report was then read, as follows:

Physiology may be defined, the study of function. Everything, therefore, that has special reference to the nutrition of the body, to secretion and to excretion, may be properly considered under this head.

Digestion is a function the object of which is the preparation of alimentary substances for assimilation, and the separation and expulsion of the excrementitious portion as fæces; assimilation is the function by which living bodies appropriate and transform into their own substance the products of digestion. Both together constitute the function of nutrition.

That the condition of the organs which it is our special province to care for is very largely dependent upon their nutrition, no thinking man will deny. In many instances a perversion of nutrient currents, a lack of tone in the assimilative or digestive machinery of the system, is primarily manifested in the teeth. A perfect apparatus must perform perfect work. Given, then, an individual with a healthy, normal nutrition, the teeth should, in the absence of malformations that may be denominated accidental and extraneous to the present consideration, be anatomically and histologically perfect. Subsequent lesions are, of course, pathological, either externally or internally, and their consideration is not pertinent to the present inquiry. Given, again, an individual with structurally imperfect teeth, and it follows, if our reasoning be correct, that the fault is nutritive.

What, then, is the exact source of the lesion? Is it in the digestive or the assimilative functions? Is it pre-natal, and therefore maternal, or is it personal to the diseased organism? Is it general or local? Is it due to improper or imperfect alimentation, or is it strictly and entirely functional? These are questions that may well make us pause in the generalizations with which we are apt to stifle the inquiries that naturally arise within us.

It has been urged that our structurally imperfect dental organs are due to unnatural habits of life; to improper diet; to the vicious preparation of articles of food; to the removal of necessary ingredients from that which nature has provided as pabulum; in fine, to an artificial and abnormal manner of living. In a paper previously published I have considered these points. You will allow me to repeat some of the conclusions to which I there arrived.

If imperfect teeth be due to any of these things, it will only be necessary for us to go back to the natives who were free from all the so-called vices of our modern civilization, to find a different state of affairs. During the past year I have received the testimony of many observers who were stimulated to inquiry by the published accounts of the condition of the teeth of certain pre-historic races. I have received letters from many professional men who have made examinations, more or less critical and exhaustive, of collections of skulls in all parts of the world, and of very many of the earlier races of people, who existed under the most diverse conditions, in all extremes of climate, whose habits of life were the most widely varied, and whose food ranged from the almost exclusively fruit diets of the tropics to the wholly animal alimentation of the frozen regions of the far north. With a single exception, all these observers bear witness to the fact of the existence of nearly all of the dental lesions of the present day; and the general verdict has been that, from the earliest times of which there remain dental traces down to the present, there have been little other than local changes in the condition of the dental organs. Our honored president exhumed about a dozen skulls of the early Egyptians, and the impression upon his mind was that they were comparatively free from the evidences of oral diseases, but, as I understand, he made no records at the time, and his evidence is but the dim recollection of hurried observations made some years since. In any case the number of skulls examined was not sufficient to indicate anything more than a possibly accidental deviation from the general condition. Dr. J. J. R. Patrick, of Belleville, Ill., has exhumed and examined the skulls of thousands of American aborigines,—races that existed long previous to the advent of the American Indian,—and his evidence is positive upon this point.

These records are fatal to the theory that dental lesions and imperfect structural development are modern, and due to our present artificial habits of living.

It is true that wild animals, in the absence of interfering accidents, have perfect dentitions; but it is also true that in them traumatic lesions heal without suppurating inflammation, indicating more perfect function. (In an examination made this summer of the skeleton of the *Elephas giganteus*—the Mastodon exhumed at Cohoes, and now in the State geological collection at Albany—I discovered an abnormality in the absence of one of the molar teeth; but any one who is acquainted with the process of the eruption and shedding of the teeth of all of the genus *Elephas*, will readily understand that this may easily have been accidental).

It seems demonstrated that general structural imperfections of the teeth of man reach far back, and antedate the historical era. As the teeth of animals remain structurally perfect under all vicissitudes of alimentation,—whether rioting in plenty or barely existing in a state of semi-starvation, whether feeding upon the crude products of nature or living upon food prepared for them in a state of captivity,—and as the teeth of man are in general structurally imperfect under all circumstances of diet and habits of life, it cannot be that mere dietetic influences exercise any very important part in the development of the teeth, and therefore the prescribing of artificial foods, of the phosphates, etc., for the purpose of supplying lacking elements, is founded on a mistaken theory. If they act at all it must be remedially.

A careful analysis of some of the foods supposed to be lacking in the phosphate elements that enter into the bones and teeth, finds an amount largely in excess of the needs of the system. Even supposing a pregnant woman to live solely upon the finest wheat flour, the amount that she would consume contains a much greater quantity than would suffice for her own wants and those of the fetus that she carries. It is a fact that pregnant women and rachitic children excrete the mineral elements largely, showing that under all circumstances it exists in excess in the food.

Considering all these facts, we must seek in functional disturbances, in impaired digestion and assimilation, the cause for anatomical and histological imperfections in the teeth. But the record of these abnormalities (if they have not already become the normal condition) extends so far back that it demonstrates these functional divergencies as inherent to the present condition of the human race. Whether in the long course of development of man in his present state from some lower order, or from some remote intellectual condition, the nervous organization—the brain, the intelligence—has been cultivated at the expense of the mere animal functions, it might be profitable for ethnologists to inquire. That the causes of the lack of perfect development in any part of the human system are in some way connected with non-assimilation, many considerations lead us to believe. That the habit of looking solely to the diet to find reasons for existing abnormalities is a search in the wrong direction, most thinking men will admit. It is time for dentists to take a broader view, and by a more careful study of function, by deeper physiological research, by the abandonment of specific treatment and a careful examination of all the factors that enter into the problem of existence, to endeavor to become physicians indeed, in the very broadest sense of the term.

The Etiology of Dental Caries.

It is indisputable that within the last five years more has been learned of the probable character of dental caries than during the whole previous history of the profession. The late discoveries of Koch, Pasteur, DuBois-Raymond, and others, in the pathology of zymotic diseases, have paved the way for investigations that have revealed the nature of many oral diseases.

Sir William Jenner was far in advance of his age when he discovered that inoculation with the vaccine matter from animals suffering with cow-pox was a protection from that dread scourge, small-pox. He had noticed the relation between the two diseases when but a student, because of the popular belief that the two were antagonistic. At length, after long study, he inoculated a boy about eight years old, on the 14th of May, 1796, with cow-pox matter, and subsequently with variolous matter, and, as he had predicted, small-pox did not ensue. But he was far from comprehending the true principles of this protection, and, until a recent period, vaccination for small-pox was but an empirical method, accidentally discovered. It was left for modern pathologists to demonstrate that all the so-called zymotic diseases, together with many others not previously suspected as such, were due to certain microscopic organisms that multiplied with astonishing rapidity in the human system; that each one of these maladies had its specific organism, but that they were antagonistic to each other, and that when certain ones had been allowed to run their course they exhausted the ability of the body to nourish certain others. Physicians had always been aware that a patient who had once had small-pox was not liable to a second attack, except under circumstances and conditions that were very unusual. The studies and observations of Koch gave us a clearer insight into the character of those organisms, for he isolated some of them and learned their life-history. Finally, Pasteur crowned the work with his immortal discoveries, and to-day we know that if a person be guarded against the intrusion of these microbes, the contagious diseases need no longer be feared. We have learned that the final dissolution of all nitrogenous substances is invariably brought about by the influence of micro-organisms, and Tyndall demonstrated that if they be excluded putrefaction and fermentation are effectually prevented.

Few, however, even in view of these discoveries, would have anticipated that any of these organisms might prove to exert an influence in the production of dental diseases. The theories concerning dental caries that had been entertained held that the disease was but a chemical solution of matter that must be considered inorganic. The fact that it was living, vital tissue was not considered, and caries was looked upon as a simple change of affinities such as occurs in the chemist's retort.

In 1868 Drs. Leber and Rottenstein published their work on "Dental Caries and its Causes," and in 1873 it was translated into English by Dr. T. H. Chandler, of Boston. In this they advanced the theory that the disease was mainly due to the influence of certain fungi of the mouth, the chief of which was *Leptothrix buccalis.* Long previously it had been discovered that vegetable organisms existed in the oral cavity, but comparatively little weight had been given to their presence, which was usually supposed to be accidental. Ficinus had averred that dental caries was sometimes due to infusorial animalculæ that produced a putrefaction of tooth-substance, and to them he gave the name of *Denticolæ.* Klencke described a soft caries caused by putrefaction, as he called it, (at present we know that caries is not produced by putrefactive, but by fermentive, organisms), and another due to a parasite that he called *Protococcus dentalis.* But these observers made but little impression.

At the International Medical Congress, held in London in 1881, Drs. Underwood and Milles produced a joint paper, in which they attributed caries of the teeth to the direct action of micro-organisms, which, penetrating the dentinal tubuli, destroyed the living substance of the tooth, leaving the inorganic matter to be broken down and washed away in the fluids of the mouth. This theory was accepted by many persons in this country, and is still vehemently urged by them.

In the laboratory of Carl Heitzmann, of New York, observations were conducted by him and by Drs. Frank Abbott and C. F. W. Bödecker, and their conclusions were published to the world. Their theories necessarily rested upon the reticulated structure of protoplasm, as taught by Prof. Heitzmann. They held that caries was essentially due to an inflammatory condition of this reticulated vital matter, and that the course of the disease did not very materially differ from that of inflammation in other tissues.

In 1881, at Wiesbaden, in Germany, at a meeting of the American Dental Society of Europe, some of those present listened to a paper by a young dentist previously unknown to fame, except as the thoroughly educated son-in-law and coadjutor of the well-known Dr. F. P. Abbot, of Berlin. This was the first of a long series of papers since published by Dr. W. D. Miller, and it was the initial point of a course of experiments and observations such as were new to the history of dentistry. The results are before the profession, and they have placed their author in the very front rank of experimental observers. He proceeded scientifically and systematically to make an exhaustive study of his subject by cutting thousands of slides of diseased teeth. In these he found micro-organisms invariably present, so that he was enabled to deduce the rule that they were in some way essentially connected with caries of the teeth. Thus far Milles and Underwood had proceeded, and to this point his observations were corroborative of theirs. But he proceeded further, and endeavored to determine in just what way they were instrumental. He made pure cultures of these organisms, and studied their life-history. He segregated a number of them, and was thus enabled to study them morphologically, physiologically, and chemically. He pursued these investigations perseveringly and unweariedly. On his late visit to this country he brought with him some of his pure cultures, and I have the pleasure of exhibiting a few of them to you now. It should be remembered that within these little tubes is contained the record of the most exhausting work, continued unremittingly for three years. So great was the difficulty that attended their production that it was a full year before he was able to segregate a single one of these organisms successfully.

He has demonstrated that caries of enamel is produced almost, if not entirely, by acids generated in the mouth; that caries of the dentine is largely, if not wholly, due to the action of micro-organisms, or ferments, that secrete or produce within the dentinal tubuli an acid that has the power to decalcify tooth-structure, and thus caries penetrates deeper and yet deeper within the body of the tooth, the decalcifying process preceding the actual presence of the organisms. By inoculating a culture fluid, or medium, with a certain definite organism, in an acid or neutral solution, he has succeeded in producing artificial caries that it is impossible to distinguish from that which occurs in the mouth. It is, possibly, unfortunate for him that he has not been fully comprehended by those who did not perceive the difference between putrefactive and fermentive organisms. It is only the latter that are active in the work of caries.

Perhaps I cannot better summarize the results that he has obtained than in his own words, at the close of the series of his articles in the *Independent Practitioner*, July, 1884:

1. I convinced myself by the examination of some thousands of slides of carious dentine that micro-organisms were always present, and that they, without any doubt, were the cause of various anatomical changes which were found to take place in the structure of the dentine during caries. Of course, the question of priority does not suggest itself; Leber and Rottenstein, as is well known, were the first to give definite expression to this fact.

2. I proved, at the same time, that the invasion of the micro-organisms was not, in the majority of cases, simultaneous with the softening of the dentine, but that large areas of softened dentine could be found that contained no fungi. Of all those who examined my preparations in America, no one, whatever his theory, ever once denied this fact. I concluded from this that the softening of the dentine went in advance of the invasion of the organisms.

3. I determined by analyses of masses of carious dentine, sufficiently large to give reliable results, that the softening of the dentine is of the nature of a true decalcification; that the decalcification of the outer layers is almost complete, and diminishes in degree as we advance towards the normal dentine; furthermore, that the same relations maintain in dentine softened in a mixture of saliva and bread, or in weak organic acids; also, that in a mass of carious dentine the lime-salts had been removed to a much greater extent than the organic matter.

4. I maintained from the first that the softening of the dentine was produced by acids, for the most part generated in the mouth by fermentation. I had, however, no direct proof of this.

5. I *proved* that fungi exist in great numbers in the human saliva and in carious dentine, which have the power to produce acid under conditions which are constantly present in the human mouth. I determined this acid, for one of the fungi, at least, to be the ordinary ferment, lactic acid.

6. I produced caries artificially which under the microscope cannot be distinguished from natural caries by subjecting sound dentine to the action of these fungi in fermentable solutions.

7. I determined the influence of various antiseptics and filling-materials upon the fungi of caries.

8. I isolated various forms of these fungi, and determined *in part* the conditions most favorable to their development, their characteristic reaction upon gelatine, their physiological action, their effect when inoculated into the system of lower animals, and their possible connection with certain obscure diseases generally attributed to the carelessness of the dentist.

At the late meeting of the American Medical Association, held in Washington, May, 1884, before the Section of Dental and Oral Surgery, Dr. G. V. Black, of Jacksonville, Ill., a man whom we all honor, read a paper that presents some novel views of caries of the teeth. I have not seen the paper in full, and am not therefore prepared to give an intelligent *résumé* of his theories and deductions, but I am assured that he will shortly present to the world a work upon dental pathology, and for that every thinking man of the profession will look with interest and eagerness.

In conclusion, I desire to say that, while wonderful progress has been made during the past year, the task is far from being completed. Dr. Miller himself says that there are yet, in his opinion, many factors that have not been intelligently or exhaustively considered. He himself will shortly commence a new series of observations and experiments, for which his previous labors admirably fit him, and from which his profession and the world of science have much to hope. Other students, in various parts of the world, are engaged in careful study, and we may well believe that we have entered upon an era that will end in the acquisition of knowledge that will enable us more successfully to cope with the difficulties of dental practice.

In reply to a question, Dr. Barrett said that the artificial caries spoken of in the paper was produced by Dr. Miller by the action of a single organism.

Prof. Chas. Mayr, Springfield, Mass., thought the whole dispute between Dr. Miller and the upholders of what is known as the "septic theory" lies in the different conception which each side has of what is meant by tooth-caries, or decay. Is decay merely decalcified dentine? Is it merely a different form or abnormal state of dentine, or is it a new production? When we have an abscess on the hand, the real point of the disease—where the pus is secreted—is not the one-thousandth part of an inch in thickness. With reference to the efforts made in New England to get at the facts in regard to the etiology of decay, Prof. Mayr said there was no sort of antagonism to Dr. Miller; but some recognition is due to the work done by other investigators. The speaker had himself performed experiments to determine whether the lime-salts were eliminated from carious dentine at the point where the disease is active; but scales which would show a variation of one fifteen-hundredth of a grain showed no loss of inorganic material. This layer, adjacent to the healthy dentine, contained 70 per cent. of lime-salts. No one else, so far as he knew, had analyzed this layer. He was, therefore, of the opinion that at the real point of decay there is no diminution of the lime-salts; that the process is physiological,—or, if you like the word better, pathological,—and that the study of the layer of dentine just at this point will enlighten us more than investigating the tissue on either side of it.

Dr. W. H. Atkinson, New York. Where does the initiation of the action nominated decay occur? The products of a process are not the process, as a process is the going-on of something. Pathology is not death; it is perverted physiological action; and when we know what the physiological process is which builds up the teeth, we will know how decay occurs, because it is the reversal of the nutrient currents for the upbuilding of the elements of the tissues of the teeth. He does not pretend to say by what process the organisms found in caries are proliferated; but, whatever it is, it is unseen. The ghost of the bacterium is there, before the bacterium can take form. When the organisms can be differentiated, we see that we are looking at the tracks of the game only. When you have a specimen under the microscope and focus it just right for your own eye, you cannot say that others will see it as you do. You have to adjust the microscope again for them to see. Just so it was with Curtis; he couldn't see the protoplasmic strings in the red blood-corpuscle, and because he hadn't seen them he denied that they were there. The nutrient currents are so fine that the natural mind cannot cognize them until it is trained, any more than solved lime can be reconsolidated without a return to the embryonic condition. We must recognize that we know nothing before we are fit to make these investigations, and when we announce results we must bring our cases and the evidence out so clearly that he who runs may read.

Dr. C. W. Spalding, St. Louis, had long held the opinion that there can be no pathological science, except it be preceded by physiological science; that there is no such thing as a pathological process or a pathological growth *per se*. The books are full of descriptions of pathological growths, when there are really no such things. They are merely perverted physiological growths.

Dr. Barrett had come here, as he believed most of the other members had come, not to study ghosts, but to consider material things, and he thought we would find it more profitable to get down to actualities. Concerning the etiology of caries, investigators, until within a comparatively short time, have not arrived at anything definite. Theorizing over the cause, or causes, is all very well; but let us, if we can, get down to actual demonstration. We want to know how best to combat the disease known as caries, and to do this we must know what causes it. It has been demonstrated pretty conclusively that micro-organisms play a very important part in the production of dental caries. He was not speaking of bacteria, which have no place among the fungi of caries. Dr. Miller has shown that the fungi of decay are vegetable in character, and fermentative organisms, which do not exist in the presence of putrefactive fungi; and he has proved the deductions he made from his investigations of carious dentine by producing artificial caries. Milles and Underwood attempted to follow in the same line, but they got putrefaction instead of fermentation, and hence did not produce caries artificially. The chief fact in Dr. Miller's discoveries is that the decay is the result of a fermentative process. The rationale of the process is that the organisms concerned in dental caries have in the mouth the circumstances favorable to their growth, as heat, moisture, sugar, etc. The first step in incipient caries is the decalcification of the enamel by acids found in the mouth. In this part of the work micro-organisms are not concerned. The decalcification goes on until the dentine is reached. The spongy mass left after its decalcification is favorable to the proliferation of the organisms, which find their way into it, and here pass through their life-history. They excrete or produce an acid, which Dr. Miller has found to be identical with the well-known ferment, lactic acid. The acid decalcifies the dentine in advance, leaving the animal portions of its structure for the further development of micro-organisms. Dr. Miller's conclusions are founded upon the observation of thousands of experiments under the microscope and in the laboratory. That fungi do play an important part in the production of dental caries, nearly all investigators are agreed; but the exact part has not been determined by all men, and all men do not accept Dr. Miller's explanation, except in part.

Dr. Frank Abbott, New York. Dr. Barrett has said we are dealing with actualities, not with ghosts. What do the gentlemen mean by "ghosts?" It is that something not yet seen by the aid of the microscope. Does it mean that we shall not have magnifying powers of the microscope that will reveal what is now hidden? It is only a few years since a microscope of 500 diameters was something wonderful, and even to-day it is astonishing the world with its revelations concerning bacteria. It is pretty well known that the dentine of a tooth consists in quite a great measure of organic materials—nearly one-third of its weight,—enough to form a frame-work in which the lime-salts are deposited and to sustain the life of the tooth. Dr. Miller claims that there are certain micro-organisms in the mouth; the speaker had never denied this. Dr. Miller also claims that there are acids in the mouth; this likewise is admitted. But when Dr. Miller goes on to say that these organisms are the producers of the acids to decalcify the tooth, and after it is decalcified they live upon its organic material, and ignores the irritability of the living portion of the tooth, he (Dr. Abbott) could not accept his conclusions. Is it possible to conceive that there is no life in a tooth or in a bone which forms part of the structure of a living being? All living tissues are subject to irritation. A reaction certainly takes place in a tooth, almost at the beginning of the carious process; when deeper portions are reached the process becomes inflammatory, just as much as absorption of bone or roots of teeth is inflammatory. He does not think it possible to account for the phenomena observed in dental caries in any other way. Both Dr. Miller's experiments and those of Prof. Mayr show that the organisms do not extend as deep down in the dentine as the disorganized tooth-structure. This deeper zone is the area of inflammation.

Dr. Atkinson. We can destroy teeth by the introduction of an acid produced outside of the mouth; but is this the specific acid which is found in the mouth? If so, there must be in the mouth a process by which acid-makers are produced.

Adjourned.

Evening Session.

The special order of the evening session was the paper of Dr. J. L. Williams, New Haven, Conn., "On Certain Disputed Points in the Development and Histology of the Teeth."*

THIRD DAY—*Morning Session.*

The committee appointed to draft resolutions on the death of the late Prof. T. L. Buckingham reported through its chairman, Dr. J. G. Ambler. The report was adopted, after eulogies had been pronounced by Drs. Ambler, Stockton, Taft, Allen, Friedrichs, Shepard, and Searle.

Dr. Atkinson read an extract from a letter just received from Dr. Bödecker, strongly indorsing the Herbst method of filling teeth. By this plan, wrote Dr. Bödecker, the most difficult cavities are made easy, and they are filled in one-fourth of the time required by ordinary methods.

Dr. J. M. Crowell, by invitation, then addressed the association on the objects of the Dental Protective Union.

The discussion of the report of Section VII., Physiology and Histiology, was resumed.

Dr. C. N. Peirce, Philadelphia, had read all of Dr. Miller's communications and those of Prof. Mayr, and he had watched closely for any change which experience might cause in their views. He thought the chairman of the Section was mistaken in his interpretation of Dr. Miller's views, and he would read some extracts from Dr. Miller's latest writings to show that he was now substantially upon the same ground where Mayr and Atkinson and many other observers are:

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* This paper will appear in the November issue of the DENTAL COSMOS.

> "Although I have now, as I think will be granted, established upon a sure basis a fact that caries of the teeth may result directly from the action of acid-producing fungi in the presence of fermentable carbo-hydrates, *the conclusion would hardly be justifiable that, by keeping the mouth constantly and perfectly free from all fermentable substances, or by repeated applications of antacids or antiseptics to all parts of the teeth, or by all these means together, we could ever banish dental caries from the oral cavity. A most powerful influence, which we do not understand, is exerted by the nutritive processes in the teeth themselves.* * * I am assured by men who have grown old in the practice of dentistry that mouths which have long been under their observation, and which practically have been completely free from caries for years, all at once, on account of some sudden change of health, show a general breaking down, or crumbling of the teeth, *en masse*, in the space of a few weeks. * * We have here a cause which lies without the domain of both bacteria and acids.

He would admit that these views differed from those enunciated by Dr. Miller some months since, but the change simply shows that he has grown. Dr. Peirce thought we could strengthen our conclusions in the matter by citing facts occurring outside of the mouth. Those interested in agriculture have noticed that potato-rot occurs only in seasons when there has been some defect in the growth. The germs to produce the potato-rot exist every year, but it is only in the years when the conditions favoring their development are present that they cause any damage. When a boy he saw large quantities of potatoes destroyed by rot in two weeks after they were put in the cellar. During the year when this occurred there had been a period of growth, then a long drought, followed by another period of growth. The wheat-rust germs also are present every year, but it is only when there comes a season of damp, foggy weather, just as the grain is heading, that any damage is done. The foggy weather supplies the proper conditions for the development of the germs, the nourishment to the head of the wheat is cut off, and we have, in consequence, a light wheat crop. Analogous occurrences are observed in various vegetables in the garden. The germs of decay are omnipresent, but their development is favored or retarded by certain conditions. We have been told for years that germs do have an agency in the production of caries, because we find them always present. On the other hand, we find cases where decay goes on for a period, the periphery of the cavity becomes dark-brown in color, and the decay ceases without the aid of the dentist. The germs are there all the time, but the conditions are not favorable for their development. Their presence is simply incidental to the disease, not a cause of it.

Dr. Barrett replied that no one could more keenly than himself appreciate his own inability to clearly set forth the views of Dr. Miller, or more poignantly regret the absence of the distinguished observer, who in his own happy manner would be able to lucidly explain and interpret all that might seem dark. Dr. Miller could speak as one having authority, and in the light of actual, personal, demonstrated knowledge. He, himself, could only reflect so much of the light as he had been able to receive through the eyes of another. But, however inadequate the presentation might be, it certainly was not open to the charge that Dr. Peirce had brought. He says that he understands Dr. Miller as asserting that micro-organisms are simply incidental to caries. Dr. Miller says the contrary,—that they do have an agency in the production of caries; that they are, in fact, the producers of it. He states clearly, however, that there are other factors, and he proposes to find out what are the other causes not yet known. But that micro-organisms are simply incidental to the cause of caries,—scavengers, as it were,—as has been urged, is not the theory which he advocates; nor do his observations imply it; nor would he, the speaker believed, assent to such an interpretation of his work.

Dr. Atkinson. It is well for us to discriminate just how far we have gone in struggling to get at the laws governing the production of caries. If micro-organisms have a part in it, we must assume that there is something to awaken them to activity, since it is admitted that they are always present. If this is logical, then it is seen that there must be a foundation for the statement that caries is merely the reversal of the nutrient current.

Dr. F. Searle, Springfield, Mass. Dr. Miller says the basis-substance and the lime-salts are chemically united to form the dentine, and that the same vital force which originally unites them can, under certain conditions of ill-health, disunite them. Recognized authorities say that the lime-salts are infiltrated as phosphate and carbonate of lime into the organic tissue—a mechanical, not a chemical, union; and the New York school teaches that the ill-health (inflammation) of the dentine, not systemic ill-health, disunites or breaks the bond of union., The term "bacteria" includes all the fungi; the fungi are vegetable forms, and the bacteria include both the animal and vegetable forms of micro-organisms.

Dr. F. Y. Clark, Saratoga, thought that there were fifteen or twenty other investigators whose labors should not be ignored. Let us give Dr. Miller all praise; but let us not ignore others who have worked in the same field. He (Dr. Clark) must dispute almost *in toto* what Dr. Barrett has advanced as the true theory of decay. He has tried to follow Dr. Miller in his investigations, but he cannot obtain the results claimed. If you take a liquid and sterilize it, how are you going to keep it so?—how preserve it so that the organisms will not find their way into it from the air, for instance? If Dr. Miller and Dr. Barrett are correct, it must be proved that the micro-organisms inject the acid which they produce into the meshes of the network of living-matter in the dentine. The results of the speaker's investigations almost convince him that these micro-organisms produce caries by the absorption of the bioplasm of the network. They cannot exist without something to feed upon; and they can't live on the lime-salts. He did not deny that they produce acids, but when only one or two forms are found in the dentine he thinks Dr. Miller's claim that they produce decay is gratuitous.

Dr. G. C. Daboll, Buffalo, thought Dr. Miller was misunderstood by many. Not only has he satisfied himself conclusively that caries is the result of fermentation, but he has actually produced caries out of the mouth. If anyone else has done this the speaker is not aware of it. If a pure culture of the caries-producing fungus is placed upon a tooth, without the proper food, there is no result; but if the organism is supplied with sugar it produces caries. When some other man has proved his theory by producing caries out of the mouth, the speaker will be ready to accord to him the credit of being on the right track.

Dr. Clark. How long was the tooth in which the caries was artificially produced out of the mouth? You can readily produce a softening of a tooth extracted within forty-eight hours; but he did not admit that the caries claimed to have been artificially produced was the same as that found within the mouth.

Dr. Daboll thought the tooth had been out of the mouth about two years. We all know that, if we put a tooth into certain acids, we shall have softening of its whole substance; but this was not what Dr. Miller did. Dr. Miller is too close an observer to be mistaken on that point; he shows that there are many varieties of fungi in the mouth; but it is impossible to get reliable results unless you produce a pure culture.

Dr. Searle had heard it stated here that fermentation and putrefaction are entirely different. If this is so, very good authorities have been deceived. He understands that putrefaction is the fermentation of albuminoid substances, and that fermentation is the fermentation of the carbonaceous elements, and that both processes are going on simultaneously in tooth-caries. Dr. Miller's error consists in supposing that he reproduces the conditions existing in natural caries.

Dr. Daboll. We have frequently fermentation and putrefaction in the same cavity of decay, but the fermentation will always be found at the periphery.

The subject was passed.

(To be continued.)

ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

The regular meeting of the Odontological Society of Pennsylvania was held Saturday evening, June 6, 1884, at the office of Dr. Darby, No. 1513 Walnut street, Philadelphia.

President Guilford in the chair.

Incidents of Practice.

Dr. James Truman. The majority of those present have without doubt seen some account of the so-called new method of filling teeth introduced by Dr. W. Herbst, of Bremen, Germany. It has created quite a sensation in German professional circles, he having given clinics in Berlin and other places to demonstrate the method. I have been experimenting for some time with this mode, in the mouth as well as out of it, having had instruments made from the cuts of Dr. Herbst. The first results were quite favorable, and led me to hope that I might be able to offer something valuable to-night, but I regret to have to say that more thorough experiment did not sustain the first impressions. We are all well aware that laying one sheet of cohesive foil upon another produces a union; and by the aid of a burnisher this may be continued to the filling of a cavity. This mode was not a success. We do not know, as far as I am aware, in what the cohesion of gold really consists. The long serrated points and the short serrated points have each their advocates, without any very satisfactory reason why one should be preferred over the other. In extended examinations made several years ago of various forms of gold, I was unable to discover by microscopic evidence that it was owing to any peculiar condition of the surface. We all know that freshly-prepared gold will cohere, but as we proceed with the filling this property alone cannot be depended on. Hence the failure by the use of the burnisher or polished gold or ivory points. The idea of Dr. Herbst is to run a smooth-pointed instrument, by the aid of the dental engine, pressing the gold in place piece by piece. This part of the process I regard as new, or at least I am not aware that it has been used before. My experiments were principally made out of the mouth, in natural teeth mounted for the purpose. The first attempts at cohesion were apparently satisfactory, but the test of solidity gave very poor results,—in fact, every effort to make a filling as we understand it was a failure. The cohesion is not perfect, and I doubt whether it is possible to make it so. Still, I would not condemn it on a few experiments. It should be fairly tested, as it may have a value not as yet perceptible. In the filling I present, prepared to-day, I made use of Quarter-century gold. You will observe that it has no density, and, not having that, it finishes poorly. It is possible to find a use for this process in cavities with strong walls, and where contouring is necessary. This subject will undoubtedly come up for discussion in our conventions this summer, and it seems to me, therefore, important that we should approach its consideration intelligently. In order that Dr. Herbst may be better understood, I quote from a report of clinics given by him (Poliklinik of Prof. Busch, of Berlin, on the 14th, 15th, and 16th of February, 1884): "The instruments should not be polished on the points, but made quite smooth. They should be of various sizes. * * * If these become too cohesive (magnetic), I place them under rapid rotation, on a piece of tin. This will have to be repeated from time to time. * * * In filling, he commences by passing a piece of watch-spring between the teeth, which must reach the gum and the border, and not quite to the grinding surface; otherwise the entrance to the cavity will be too contracted. I now take a steel needle (darning or sewing needle) or tooth-pick, but prefer the needle, as it takes up less space; this I press closely between the steel spring and the adjoining tooth, breaking off the extending portion." To aid in holding the watch-spring in place, he fills the opposite cavity, if there be one, with shellac, being very careful not to have it too hot. This covers the process, the rest of the report being made up of operations performed, giving the amount of time required for each insertion. It is very questionable whether this plan of filling teeth will ever be adopted in this country in packing gold, but I am satisfied it will be found very useful with amalgam, having tried it here with a great deal of satisfaction.

Dr. E. C. Kirk. I have never tried the method, but it seems to me that there is one mechanical difficulty in the way, and that is that you are obliged to use instruments which are necessarily straight; otherwise you cannot place them in the engine, and all teeth cannot be filled with instruments which are perfectly straight. Nearly all of our instruments are curved or bent.

Dr. Guilford. There are two or three objections, and one is that these points necessarily press in all directions.

Dr. Kirk. I do not see how they can press cohesive gold in all directions. That is one of the difficulties in working with cohesive gold; it cannot be consolidated by lateral pressure—only by direct.

Dr. Guilford. This point, when pressed down, presses in all directions. He does not pretend to fill a cavity except within circumscribed walls, unless he puts an artificial wall there, formed by a matrix.

Dr. Leech. If the tooth stood alone, then he could not fill it. What are the special advantages claimed for this mode of filling?

Dr. Jas. Truman. He claims that it will do in fifteen minutes that which would take an hour by the ordinary mode. I do not question that it can be done, but the point is whether the filling will be good for anything after it is done. I have not been able, by any experiments which I have made, to secure any solidity.

Dr. Leech. It seems to me that, as he has to go to the trouble of making a matrix filling out of it by the use of an old piece of steel, it has no advantage over the old way.

Dr. Register. I think it would be impossible to get a filling that would be solid with a smooth instrument from rotary motion. At the same time, I think that with a smooth-pointed instrument and the use of No. 60 rolled gold a perfect filling can be made with a smooth point, using the blow of the mallet.

Dr. Truman. I cannot understand how you can make a solid filling. It may appear to be solid, but is it?

Dr. Register. I have had them to curl out, like a piece of solid metal, from the result of mastication, and I have cut them down with an ordinary cavity burr.

Dr. Truman. Of course the matter is to be still further tested. This is only preliminary. What I wanted was to bring the matter up and let each member test it for himself. Anybody can do that very easily.

Dr. Register. I believe it takes a very much lighter blow to make gold cohesive than is supposed.

Dr. Guilford. It depends upon the thickness of the gold.

Dr. Register. Of course it does, and its physical nature must be considered.

Dr. Truman. There is one thing which may be said about filling teeth out of the mouth. As far as my observation goes, it is a particularly difficult thing to make a good filling in an old tooth outside of the mouth, on account of its brittleness. It is much easier to make a good filling in the mouth.

Dr. Darby. It seems to me that, if I were to use a burnisher for packing gold, I should prefer a corrugated one. A little irregularity of the surface would be apt to give a better result than a perfectly smooth or even one. I made use of an old burr, first grinding off the teeth, and then smoothing it upon my oil-stone, and, although I could pack gold with it, the result was not satisfactory. I question whether there is anything in this new method that will be of any value to us in America, since our method of working gold is so unlike that just described.

Dr. Register. Does Dr. Truman think the dentists of Germany have reached the perfection of filling with gold that we have?

Dr. Truman. The German dentists are not all alike, though the majority I think are not up to our standard. There are many very good operators, and the number is increasing annually. Dr. Herbst used a gold made in Bremen similar to Williams's gold.

Dr. Guilford. Did he state how thick he used the gold, or in what way he prepared it?

Dr. Truman. I am not aware that he regarded that as of much importance.

Dr. Guilford. Dr. Geo. Herbst, the brother of the man who invented this method, showed me a number of appliances for operating, while in this country, and they proved that both he and his brother were very ingenious men. I appreciate their ingenuity; but, at the same time, I cannot see anything in this method which will benefit us in any way.

Dr. Chupein. I would like to ask if any of the gentlemen present have tried the bichloride of mercury for the treatment of pulpless teeth. It is claimed that if very weak it will destroy all kinds of bacteria, and Dr. Abbott, of New York, maintains that the cause of trouble always in all these pulpless teeth, when we come to fill them, is the presence of bacteria, and that by cleaning them we destroy the bacteria that are in the roots. Now, if the bichloride of mercury will destroy bacteria, it strikes me it ought to be a good thing for the treatment of teeth which are pulpless.

Dr. Guilford. There does not seem to be any response. It seems that none of the gentlemen present have experimented in that direction. Has any gentleman tried Dr. Kirk's suggestion as to sodium carbonate? I tried it, and it succeeded very well for a few days; but the patient took sick and did not return as soon as she should. When she did return the tooth was again sore.

Dr. Kirk. I am still using it, and using it successfully, particularly in the treatment of sensitive dentine. It has been my practice to partially dry out the cavity and introduce a small particle of the sodium carbonate, leaving it there for a few moments, and then to remove it, after which I find I can proceed with the preparation of the cavity without any considerable pain to the patient—a result much to be desired in the treatment of the teeth of children and delicate nervous patients.

Dr. Guilford. Without the rubber-dam?

Dr. Kirk. With the rubber-dam.

Dr. Darby. I have just had some pleasing results from the use of permanganate of potash. The case was that of a central incisor which had been filled by another with a plastic filling. After removing the filling, with the intention of substituting gold, I found the pulp was devitalized, and the pulp canal filled with the most offensive putrescent pulp-tissue. The odor was digustingly stenchful. After removing this matter as best I could, I made a fresh solution of the permanganate (in color about like claret wine), and then wiped the canal thoroughly with this, using it time and again until I felt that I had made thorough work with it. Then, putting a dressing of the same solution in the canal and closing the cavity of decay with gutta-percha, I sent the patient away with instructions to return in case pain followed. She did not return, as I had feared she might. At a subsequent sitting, a few days later, I repeated the application, and with the exception of a slight soreness there was no trouble. When I saw her the third time the cotton removed from the canal had no disagreeable odor, and at the next sitting I shall fill the tooth. I feel confident that if I had used creasote or any other of the antiseptics or disinfectants formerly in use, I should have had trouble; for it is in just such cases as these, where the pulp canal is filled with liquid or semi-liquid putrescent matter, that we look for trouble if the tooth be closed.

Dr. Guilford. Was there any soreness at the root of the tooth?

Dr. Darby. There was some little soreness there; but she told me it passed away under this simple application.

Dr. Tees. Under ordinary circumstances, do you think there would have been soreness from closing up the pulp cavity?

Dr. Darby. I should have expected it under the old mode of treatment in at least nine cases out of ten.

Dr. Tees. I have tried Dr. Kirk's method of using the sodium carbonate, and I found difficulty in using the fine crystals. I would like to ask him if it would not be better to use it in solution?

Dr. Kirk. I have found it convenient to keep a box of crystals at hand, but a solution can be made at any time. Used in that way it would be taken up by capillary attraction. But I do not think the solution would be as efficient. While I am up I would like to say a word in favor of permanganate of potash. We all have those disagreeable cases, that come to us from time to time, of people who have never known the use of a tooth-brush, or cleansed the teeth in any manner, rendering it almost impossible to operate for them, owing to the offensive odor of the breath. In such cases I always make a dilute solution of the permanganate and direct the patient to rinse the mouth two or three times, after which the objectionable odor of the breath entirely disappears. In regard to Dr. Darby's treatment of the tooth of which he has spoken, I would like to ask him if he found any discoloration on the inside of the tooth-walls resulting from the permanganate?

Dr. Darby. I did not.

Dr. Guilford. I would like to ask whether any of the gentlemen have found any number of cases in which the tooth became discolored from the use of it? I have noticed that in some of the dicussions in New York it is said that a permanganate solution will discolor a tooth.

Dr. Kirk. It can be readily removed by the use of oxalic acid.

Dr. Darby. In speaking of the disagreeable odor, I may say that I have used the permanganate in the same way, and I have also found a remedy in "listerine." We all know how the odor of tobacco smoke remains in the mouth. I had a patient come to me a few days ago to have his teeth operated upon, and his breath was very heavy with the odor of smoke. I took some of this listerine, put it in a glass of water, and gave it to him to use as a mouth-wash. He did so, and it entirely removed the odor of the tobacco smoke. It is one of the best things to take the odor of smoke out of the mouth that I know of.

Dr. Register. In regard to listerine, I may say that I made use of it on one occasion, after removing tartar from a loose tooth. There was one of the teeth in particular which was very loose, on which I used it while removing the tarter. The gentleman on whom I operated, who was a physician, brought the listerine to my notice, and said he used it in the family as a mouth-wash. Some two or three days afterwards he came into my office and showed me the tooth, and really it was quite firm it its socket. All the looseness had disappeared. Whether it was from the removal of the tartar or from the effects of the listerine, I cannot say. I have made considerable use of a preparation called Dobble's solution, which is an article favorably spoken of by specialists in their treatment of diseases of the nose and throat and troubles of that kind. In cases of pyorrhea alveolaris, after using mineral acids, I have had my patients supply themselves with Dobble's solution, and with a syringe force it down into the pockets around the teeth, and I have had some very satisfactory results from it. To-day teeth that I thought were almost worthless are comfortable and useful in the mouth, after perhaps two years' use of this article,—the patients being careful to have the tartar taken off the teeth every three or four months.

Dr. Guilford. What is that solution composed of?

Dr. Register. I cannot tell you positively; but I think it is composed of carbolic acid and soda.

Dr. Kirk. I would like to ask Dr. Darby what has been his experience with the use of listerine?

Dr. Darby. I have used it as a mouth-wash, and as a disinfectant, and in cases of pyorrhea alveolaris.

Dr. Kirk. Have you ever used it in cases of pulpitis?

Dr. Darby. No, but I am of the opinion that it would be a good dressing for that purpose.

Dr. Jefferis. I have used it in a number of cases; but I was disappointed in it. I have, however, had very good results from the use of boracic acid in cases of pulpitis. I would like the gentlemen to get some, and try it by packing it in the teeth.

Dr. Kirk. I believe boracic acid is one of the constituents of listerine.

Dr. Guilford. The odor reminds me of eucalyptus more than of anything else.

Dr. Truman. The predominant taste is that of thymol. I have used it to some extent; think it is very valuable as a mouth-wash. It appears to me to be more valuable for that than it is for the treatment of diseases of the pulp.

Dr. Guilford. It is slightly flavored with wintergreen.

Dr. Truman. I think that in abandoning thymol we lost sight of one of the most valuable agents. To my mind it is one of the best constituents for a mouth-wash we have.

Dr. Tees. During the winter I had a stubborn case, it being a superior molar, in which I tried sodium carbonate. I had prevented any severe effects by the use of coal-tar creasote, chloroform, and alcohol, and giving vent for a week or two at a time, so that there was just a slight but continued inflammation. It annoyed the patient occasionally, but did not keep her awake at night. About that time I saw Dr. Kirk's article in the DENTAL COSMOS on sodium carbonate, and I gave it a trial. I made an application of it, and the patient reported at the next sitting that it pained her very severely for several hours afterwards, but that since then it had not troubled her any. I then removed it and applied creasote, and sealed it with oxychloride. Since that time, about four months ago, there has been no trouble with the tooth. In this instance I was successful, although I was discouraged from using it in other cases, on account of not being able to force the crystals into the proper place.

Dr. Truman. I am gratified to hear Dr. Kirk indorse the use of an alkali in sensitive teeth. I have been trying to enforce this idea for the last ten or fifteen years, with only moderate success. It is the true direction to look for good results. I have always used the bicarbonate of soda.

Dr. Register. Can any one tell me the active principle of "Näboli?" I provided myself with a box of this medicine when it was first introduced, and I must say that it gave me the best results that I ever secured from anything of the kind. Where teeth are very sensitive at the necks, where we have recession of the gums, and where they become very sensitive, I have always found them to yield to the treatment of Näbolï.

Dr. Guilford. Tannic acid is the active principle. It is tannic acid and glycerin for the first three numbers in different proportions, and the fourth is chloroform. It is the tannic acid that does the work. Number one is weak; number two is stronger; number three is stronger still, and contains the greatest amount of tannin; while number four is a wash something like chloroform.

Dr. Darby. My experience with it is that patients complain bitterly that it causes a great deal of pain. It has done good, but it has caused pain.

Dr. Tees. In regard to the use of medicines about which we know nothing, I advocate them to a certain extent. The lives of three of my children were saved by means of proprietary remedies. Dr. Register uses Näbolï because it gives relief, and he is justified in using it for that reason. I think we are very foolish and inhuman if we do not use them when other remedies fail, and they produce good results.

Dr. Register. I do not wish to create the impression that I use Näbolï in a reckless manner, because I do not. When I first got it I used it very carefully, and was also very careful to examine the condition of the tooth afterward. I found no bad effects from its use, but, on the contrary, good results, and so I came to use it very generally.

Dr. Kirk. I desire to report some tests I have been making in the conditions we frequently see in the mouths of patients wearing vulcanite plates, which we term "rubber sore mouth." Some time ago I examined the mouth of a lady who was wearing a rubber plate which had been repaired, and had therefore been subjected to two vulcanizations. The surface of the newly added rubber was everywhere corroded or roughened, apparently by some active solvent, while the surface of the original plate was hard and polished. The tissues in contact with the plate were red and highly inflamed, but the inflammation corresponded almost exactly in shape and extent with that portion of the rubber plate which had been recently added, and, therefore, vulcanized but once, and perhaps imperfectly. On testing the reaction of the inflamed mucous membrane, and likewise that of the mucus adhering to the upper surface of the plate, I found both distinctly alkaline—I might say strongly so. Since then I have tested at least half a dozen rubber sore mouths, and in each instance the reaction has been markedly alkaline. In all cases that I have examined, where the mucous membrane was pink and healthy under vulcanite plates, I have found the secretion to be neutral or slightly acid. Our positive knowledge as to the etiology of this troublesome condition is very meagre. It has often been attributed to the vermilion used as coloring matter in red rubber; yet we know that vermilion is insoluble. There is nothing, so far as I can ascertain, that will dissolve it which will represent a solution of mercuric sulphide, and it is only decomposable by a very high temperature or a strong mineral acid. More than that, every particle of it in a vulcanized plate is enveloped in a film of vulcanite, which would clearly protect it from contact with the oral secretions. It has been asserted that the temperature of vulcanization is sufficient to effect the decomposition of the vermilion, and the injurious results are produced by the presence of the free mercury in the finished plate; yet this would seem to be theoretically impossible, at least, from the fact that a large excess of sulphur is added to the mass along with the vermilion, the contact of which would immediately re-convert any free mercury into mercuric sulphide during the process of hardening. It has also been suggested that the sulphur entering so largely into the composition of vulcanizable rubber was a factor in the production of rubber sore mouth, and that sulphur is soluble to a certain extent in alkalies; but this would hardly seem plausible in view of the slight medicinal activity of sulphur, even admitting that a large percentage of that introduced in rubber exists uncombined, which excess exerts only a mechanical effect on the mass. I have brought this subject up in order to learn if any of the gentlemen present have tested the reaction of the secretions in cases of rubber sore mouth. It would certainly be an interesting fact if this inflammatory action was found to occur only in connection with an alkaline condition of the oral secretions. My own experience, in the few cases I have tested, has shown this to be the case without exception. While we all admit that the non-conductivity of rubber plates is frequently a source of irritation, yet there is much evidence to show that this quality of vulcanite does not account for all of the irritative influence it seems to exert in many cases.

Dr. Darby. I have seen two remarkable cases of sore lips and face,—one of a lady who came to me perhaps a year ago. I was filling some teeth for her, using the rubber dam, with a napkin laid under it. The next day, or a day or two later, she came back with almost the worst looking face I ever saw. It looked as if it had been blistered, and she said her physician told her that I had poisoned it by the use of something. I concluded, of course, that the saliva might have been acid; or that, lying in contact with it for a considerable time and excluded from the air, it produced these blisters. A few days ago a young man came to me upon whose teeth I was operating, using the rubber-dam. When he came back, a few days later, to have a wedge put in for another sitting, he said, "Doctor, I had an awful face after I was here. It was all a mass of blisters." I wondered whether there was anything in the rubber that could have produced it. I presume there was not. I merely mention it to see if any of the other members present have had a similar experience.

Dr. Guilford. What kind of rubber was it?

Dr. Darby. In the last case mentioned it was the new white rubber. In the first case it was the ordinary rubber, such as has been in use for years.

Dr. Leech. A lady from Chicago cautioned me to wash the rubber a second time before using it, because every time it was used without this care she got "fever blisters," as she called them; and I always gave it an extra washing before applying it. I never had any trouble, because I took this extra precaution. I was always careful to use a coarse napkin upon the face, so that the rubber would not touch it any more than was necessary.

Dr. Darby. My theory is that it was the acid of the saliva, or some abnormal condition of it, that caused the trouble.

Dr. Register. I operated upon a lady who came to me some days afterward with her lower lip in a very deplorable condition. It was a mass of blisters from one end to the other. I asked her what was the cause of the trouble, and she said she did not know, unless I had caused it. She said she had applied an ointment, and I thought that perhaps the trouble was caused by its use.

Dr. Tees. I lost a patient some two or three years ago in that way. There was a breaking out of pimples all over the parts covered by the dam, a day or two after the operation. I really could not believe it due to the rubber, because I had used it so much for many years, and had never had any such results before. I ascribed it to impurities of the blood. He told his mother he was not going to that dentist any more. So he went to another, who filled cavities with oxyphosphate, napkins being used. He came back a few months ago, and I said, "Sammy, I will use the rubber-dam again. You are a different man now,—your blood is pure." I saw him a week or two afterwards, but there were no after effects in that case.

Dr. Dixon. It seems to me it could not be due to the rubber, because I had that experience long before it came into use, and I think Professor Darby says he used the napkin between the rubber and lips in the case to which he refers.

Dr. Guilford. I have noticed, in cases of my own, that it generally occurred in hot weather, and I always use a napkin under it.

Dr. Register. A rubber-dam makes a most excellent blister. I have used it on a horse with a lame leg, by binding it on the knee, and in twelve hours it raised plenty of blisters, by simply excluding the air.

Dr. F. M. Dixon. The subject I broached at the last meeting I had intended to have written out, and to have read the paper at this meeting. However, I have not been able to do so, although I have the same memoranda, from which, as the hour is late, I will read such parts as describe the case, and probably that will be all that will be necessary: "Mr. J. S., a minister of one of our churches, came to me in 1868, to have a partial set of teeth—the four superior bicuspids, cuspids, and incisors—on a silver plate, the natural molars being *in situ*. The plate was made as usual, clasping the natural molars. This was worn for a year, at least, when a niece of the patient called at my office and stated that her uncle wished to see me, as he had had a fit, and they supposed had swallowed his teeth. I found two incisions, one on each side of the esophagus, extending as far down as I could see, such as the edge of the plate would make, which satisfied me that the teeth had gone down. The patient was a large, muscular man. I took the impression of his mouth and made a second set. Now for the sequel. I was in my office just nine days after the second set was made, when the door opened and in walked my patient, holding in his hand the first set of teeth. Of course, my first question was: 'Where did you find them?' supposing that he had put them down somewhere and had just discovered them; but he replied that he was washing his face a few minutes before, and while bending over the basin something moved in his throat, which produced nausea, and out dropped the teeth." I first thought of making this statement rather from the singularity of the circumstances than otherwise; but it occurred to me that it illustrated very markedly the danger patients are subjected to by the careless adaptation of plates; and I thought it well enough to call attention to that fact, that by knowing of the danger to which we are liable measures may be taken to prevent them.

Dr. Darby. May I ask the name of the patient? I think I have heard of it before, and that I remember the circumstances.

Dr. Dixon. The gentleman was a clergyman of Frankfort.

Dr. Truman. At the last meeting I spoke of the article of Jul. Parreidt (*Vierteljahrsschrift für Zahnheilkunde*), in which he gives sixty-two cases of swallowing teeth, and of the effects in connection with them. Of course, it is too detailed to read here, nor would it be necessary to go over the whole matter; but the subject is to me one of great interest, for I do not think we pay sufficient attention to the matter of inserting artificial teeth. Dr. Parreidt sums up these sixty-two cases by saying that twenty were swallowed in sleep; in spasms, six; three in the night; in eating, five; drinking, two; taking of a pill, two; by a dream, or through a dream, two; fainting, one. Six of those resulted in death. There is one case where he speaks of a man living for twelve months with a set of teeth under his tongue, which he cannot explain; but it is not disputed to be a fact. We all know how teeth will get coated with tartar, and remain so for years. The different positions which these plates have occupied after being swallowed and finally thrown out in ordinary processes, is rather remarkable. It is only astonishing to me that some of the large-sized plates, the cases of which he reports, could go into the stomach at all. One remarkable fact is, that a large proportion of them were metal plates. His idea, in summing up the matter, is that plates and clamps, perfectly smooth, will pass into the stomach and out without any trouble, and not produce death; but if they have jagged edges, where the clamp has been broken, it is almost certain to end disastrously. We had a case here reported in the papers a few days ago where the individual swallowed a partial set, but I know nothing as to the result.

Dr. Dixon. It may be well to add that the case to which I have called the attention of the society is reported by Dr. William Dixon, of Frankfort. For several years I have deeply thought of the dangers that might accrue from a careless adaptation of plates, and more especially the fixtures for regulating teeth as inserted in the mouth, and I have made it a practice for years past of tying the fixtures to a tooth, which can generally be done very easily; and the patient can be taught to remove and replace them; if not, it is a very easy thing to adjust them in that way, and to remove and replace them when the patient calls for treatment.

Dr. Darby. The wonder is that people do not swallow these little fixtures that we put in more frequently than they do. I feel that there is danger of their doing so. We have in the museum at the University a plate that was sent to me some years ago which a patient had swallowed, and that had passed through the alimentary canal. That plate is at least one and a half inches long and one inch wide, and it had passed through the bowels. My friend, Dr. Keen, showed me a gold plate, perhaps two or three years ago, with three teeth on it, that a patient had swallowed. She rushed to him and told him that she had swallowed her plate. He at once gave her an active cathartic, and she was thus relieved by a natural process. I do not know but that plate is in use at the present day. There is a case recorded in one of our medical books where a man swallowed a jack-knife upon a wager, and then another, and then another, until he had swallowed twelve, and yet he lived eighteen months.

Dr. Dixon. It is one of the curiosities of medical literature that we have very recently seen a case reported in which a lady lost her life by swallowing a watermelon seed, which lodged in one of the intestines.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

(Meeting of May 6, 1884, continued from page 555.)

Dr. W. S. Elliott read the following paper on

"FERMENTATION."

Progress in the science of our specialty has led to the consideration of subjects occult and deeper in significance than was formerly thought pertained to practice. Lifted from the mechanical plane of our work to the cognizance of function in the living body, we exercise the same spirit of penetration as when studying the powers of the pulley or wedge, the inclined plane or screw; and we claim it to our credit that important questions are solved through the associate effort of those who would learn and be advised.

It is in the spirit of professional intercourse that I respond briefly to the invitation to read this paper. I will refer to a subject animating the world of thought,—one which bears strongly upon our own individual well being, and one which must command the attention of every one of us who claims to be instrumental in ameliorating the physical sufferings of mankind. Modern investigation, especially microscopic, has given us something important to study, but a full apprehension is beyond our present claim, and we are yet filled with the spirit of active inquiry.

Function is common to all living bodies, and is graded to the requirements of the individual. Normal changes follow the impress of type, but deflected energy indicates disease, and the attending phenomena demand at this hour our closest consideration. The germinal cell or corpuscle has its limitations of destiny defined according to its descent, and to understand the possibilities of the one we must inquire into the other. Accordingly we note the conditions attending the low order of being as guidance to the study of the most advanced pertaining to our own individualities. In chemical action we note the perturbation of force. In biological phenomena,—that is, life manifestation,—besides the simpler changes of affinities, there are associated other operations which are not so easily defined, and which we estimate from a higher stand-point; and here it is that we pause to make our special inquiries. Our interests have been the more recently drawn toward the so-called bacterial or germinal aspect of disease, and have questioned the influence of and part taken by these micro-organisms. True understandings have been difficult of approach, and I think but little has been demonstrated.

We have, however, long enough studied the phenomena of fermentation to be able to draw some analogous conclusions in the department of pathology. The brewer and the vintner learn by practical observation the favoring condition attending the production of the resultant spirits. The scientist has sought to learn how fermentation is effected; and here, it seems to me, should our attention be first directed in our studies into these newer theories of disease. To Lavoisier we owe a debt of gratitude for his researches in this direction. Stahl was prominent in his inquiries, but held a very crude idea of the nature of fermentation, and it was not until the beginning of the present century that any true conception of the phenomena was entertained. Pasteur, perhaps, is the most prominent man of modern times who has carried conviction to those who doubted, and his views are very generally accepted.

In the introduction of a late work on this subject the author lays some stress on the oft-expressed recognition of a special force in all biological manifestations as indicating a distinction between chemical and vital phenomena. Whatsoever views may be entertained in regard to this, it would seem that fermentation did really occur only under conditions commonly known as vitalized; that the living globule was essentially the prime factor in the changes therein occurring. The chemical atom and the molecule of the physicist we may set down as fixities under the circumstances in which they are integrated. The biological molecule and the integrated cell become active integers in the progressive steps toward tissue building, but these have their limitations, as before observed, to the extent of their endowment.

We may watch with interest the budding of the yeast-globule. We see it, through various stages of being, gradually approach its adolescence, when the round of its life is completed. The yeast-globule is a living body, and like all such it performs the function of respiration, in that it assimilates nutritive material and rejects that which has become effete in its parted energy. Water is necessary to the life of the globule, and from this, as from other associative media, does it breathe in the O of vivification. Where there is engagement there must also be disengagement of affinities to constitute the phenomena which fall under observation. The assimilated O now loses its distinctive character, and, having become joined to C, is exhaled as CO_2. Pure water is, however, too staple a compound to be thus easily acted upon and decomposed; but let a portion of grape sugar be therein dissolved, then will disintegration ensue and the yeast be energized to its maximum degree. After a period of incubation—

say 24 hours—there will be perceived a disengagement of microscopic bubbles, which upon test prove to be CO_2. Carbonic dioxide is essentially a product of combustion. In so far as this is concerned, we note only a chemical reaction, estimating it from the stand-point of inorganic chemistry. There is a splitting of the molecule of sugar into its elementary constituents with the production of—besides CO_2—a quantity of ethylic alcohol. While I do not desire to dwell particularly upon this reaction, suffice it that I refer to the express formula:

$$\underset{\text{Grape Sugar.}}{C_6\,H_{12}\,O_6} = \underset{\text{Alcohol.}}{2C_2\,H_5\,HO} + \underset{\text{Carbonic Acid.}}{2\,CO_2}$$

Now, it is evident that, through the respiratory energy of the ferment, the O of the sugar has been assimilated, and having united with the C, has been expired as CO_2, and alcohol left as a resultant product. With the recognition of the living capabilities of the fermenting agent in this instance, we are led to regard other manifestation as having a similar relationship, and we may set aside the theory of catalysis, which seems to give no explanation of a satisfactory nature. I deem that it makes no difference whether these ferments are isolated, or whether they form an integral part of a more complicated organism; we study the process from the same basis.

The entrance of a living cell or globule into a territory which affords suitable pabulum for its maintenance, growth, and duplication must and will inculcate changes more or less remote from a normal condition, and correspondingly establish a state of recognized disease. Not that we would assume that every ailment had its origin in the fermentative act, for we note the powerful influence of other environment, principally of a physical nature, to the establishment of a minus degree of energy. But continued retrogression is perceptibly enchanced by the introduction of spores which exert their biological energy to the disturbance of the equipoise of chemical solution.

I have referred to the familiar instance of alcoholic fermentation, under given conditions. Let these conditions be varied, and we will see what are the variations of product. Complete combustion declares itself in the production of CO_2 and water. But in this case let the combustible body be the alcohol of the former reaction. Under this the alcohol disappears and gives place to acetic acid, having to this end imbibed a necessary equivalent of O from the atmosphere. The change is thus expressed:

$$\underset{\text{Alcohol.}}{2C_2\,H_5\,HO} + O_2 = H_2O + \underset{\text{Acetic Acid.}}{C_2\,H_4\,O_2}$$

This is an instance confirmatory of the observation made on this floor that there can be no acid without bacteria,—or, more directly, that there can be no acid without fermentation.

Another point not as yet brought forward is in regard to the necessary conditions required for the maintenance of the vigor of the fermenting agent. While it absorbs O and gives out CO_2, it must need also a nitrogenous element for its own nutrition and growth. Thus, if any ammoniacal compound—say the tartrate of ammonia—is introduced, the rapidity and perpetuation of the fermentation is greatly enhanced.

We have separated these phenomena, but have made no allusion to the differentiations which really occur in the fermenting body. Whether this be a direct transition of the one kind of cell to that of another, or whether two distinctive cells exist, I am not prepared to say. The structure and method of duplication of the yeast-cell are shown in the diagram. As compared with this is the mycoderm of the acetic fermentation, which consists of very minute elongated cells connected in chains or in the form of curved rods. These belong to the family of bacteria. Other forms of fermentation, as lactic, ammoniacal, and butyric, bear also the same relationship to organized bodies as promoters of the observed changes of which we have spoken.

The conclusion to which we come, and which is supported by the highest authorities, is that in all instances of fermentation we must look to the intervention of a living proteide as the prime factor in the changes, and that the fermentable substance must contain sufficient nitrogenous elements to support the respiration and nutrition of the ferment. This conclusion having been arrived at, we naturally go back to ask, What is the origin of the ferment? Here we at once enter upon debatable ground, for the question involves all the theories set forth respectively by the spontaneous generationists and their opponents. Whatsoever may be the possibilities of the generative force working upon and within the inorganic material, we know that there has not been, and we cannot conceive how there can be, any positive demonstration of a transition from such so-called dead matter to a living conscious body. We must, then, accept this one postulate, that the cell-body exists; that it is endowed with an energy qualified to its own maintenance and the duplication of its kind. But within the life-sphere we may more profitably trace the various conditions and habitat of these minute organisms. This has been the work of eminent modern investigators, and the literature of the day is quite abundant upon this question. It is recently announced that the cholera-germ has been positively demonstrated, and with the same surety that has attended the discovery of the germs of tuberculosis, diphtheria, etc.

Applying these observations to our own work, we will proceed at once to question as to their significance. The histo-pathological nature of caries of the teeth and associate parts has been of late an absorbing topic of discussion, and it has not escaped the notice of investigators that in all these phenomena micro-organisms play an important part. The assurance, too, is preponderating that, unless these agencies are eliminated or annihilated, we have no prospect of permanent success in treatment.

Having reviewed the conditions favorable to the life of the bacteria, we would desire to be enlightened as to those of an opposing quality. Empiricism has led to a considerable degree of success in practice, and it becomes us to seek such progressive measures as are therein indicated.

It has been shown that O is an element necessary to the life of the bacterial cell. We understand its vivifying agency to the normal tissue, and in the struggle for existence advantage ground is gained on the part of the latter through its superior natural endowment, if otherwise favorable environment is presented in its behalf. But while O is the element of the respiration of the bacterial cell, an excess is equally as detrimental in the checking of its activity and multiplication. A due correlation of force seems as necessary here as under higher physiological states. The administration of oxygenated medicinal agents seems to corroborate this view. Thus, we find favorable results in the topical application of permanganate of potash and peroxide of H, not only in the reduction of the disintegrated products by oxidation, but in the checking of the functional activity of the parasite. Other agents, classed as anti-parasitic, are doubtless as useful under such modifying conditions as are coincident to their powers. These are carbolic acid, creasote, listerine, corrosive sublimate, sulphurous acid, boracic acid, iodine, bromine, chlorine, etc. With these understandings we may the more thoroughly appreciate the rationale of the measures adopted, which would otherwise be deemed simply empirical.

I would not press this subject upon you did I not believe that it bore strongly upon our practice. The field of observation is comparatively new, and I am certain that all who have as yet devoted themselves to the subject with assiduity have been eminently rewarded.

Dr. W. H. Atkinson. If we want to know what we are doing we must study the tissues we work upon, and understand their molecular changes. If we would comprehend the process of digestion, we must understand oxygenation and oxidation, which terms state the two degrees of combination producing all the elements of the tissues. When combustion is the subject, we must know whether that combustion results from carbon-oxide or carbon-dioxide. How many of us understand the principles by which combustion is brought about in our bodies? Whenever the molecules are broken up in the presence of other molecules that have an affinity for any of their elements, they are in a state that is called the nascent state. The molecule is broken up, and while just wavering between the combination in which it was before and the one it is going into, it is gaseous, although for the moment it does not appear as gas in its metamorphosis. Whenever we belch up wind from the stomach, or pass it from the bowels, we are sure the molecular changes were not well performed, and the burning was incomplete. When we get hold of these points we will be better able to understand the mode of digestion and the action of the micro-organisms, that seem now to attract the attention of physiologists and therapeutists to a more general extent than it has ever done in the history of medicine; although over two hundred years ago that noble man, Leeuwenhoek, with very poor appliances, saw that which we have seen, and made at that time such drawings as very few of us can imitate to-day. Let us make ourselves worthy of our humanitarian profession, and we may soon understand something of the changes that occur in the cases in our daily practice; for undoubtedly, wherever there are any of these changes taking place, they occur either in an open chamber or in a closed sac, and, if it is in a closed sac, oxygen is shut off, and you do not get complete digestory changes.

The society then adjourned.

JAMES E. DEXTER, *Secretary.*

DENTISTS' BENEVOLENT ASSOCIATION.

THE first annual meeting of the Dentists' Benevolent Association was held at Sweet Springs, Mo., July 10, 1884, the president, Dr. C. H. Darby, in the chair.

About twenty-five of the members were in attendance.

The reports of the secretary and treasurer were received and approved.

The following officers were elected for the ensuing year:

Dr. C. H. Darby, president, St. Joseph, Mo.; Drs. F. Swap, Booneville, Mo., J. J. R. Patrick, Belleville, Ill., W. H. Eames, St. Louis, Mo., R. E. Nickels, Salina, Kan., J. W. Reed, Butte City, Montana, and Mr. F. X. Coombs, Chicago, Ill., vice-presidents; Dr. R. I. Pearson, Kansas City, Mo., secretary and treasurer; Drs. A. H. Thompson, Topeka, Kan., J. A. Price, Weston, Mo., J. M. Austin, St. Joseph, Mo., Geo. H. Cushing, Chicago, Ill., G. W. Tindall, Kansas City, Mo., C. B. Hewitt, Kansas City, Mo., J. D Patterson, Kansas City, Mo., H. S. Thompson, Kansas City, Mo., A. C. Schell, Kansas City, Mo., and J. S. Letord, Kansas City, Mo., board of directors.

This association is duly authorized by charter from the State of Missouri to carry out the objects of its organization; is composed exclusively of those identified with dentistry; has no salaried officers or other excessive expenses, and offers to those eligible to its benefits a safe and reliable means of providing for their families in case of death. Correspondence solicited.

R. I. Pearson, *Secretary*,
2206 Troost Ave., Kansas City, Mo.

GEORGIA STATE DENTAL SOCIETY.

The Georgia State Dental Society held its regular annual meeting at Atlanta, Ga., the second Tuesday in May, 1884.

The following officers were elected for the ensuing year: A. G. Bouton, president; J. S. Thompson, first vice-president; S. M. Roach, second vice-president; L. D. Carpenter, corresponding secretary; G. W. H. Whitaker, recording secretary; H. A. Lowrance treasurer.

The next meeting will be held in Savannah, the second Tuesday in May, 1885.

L. D. Carpenter, *Corresponding Secretary*, Atlanta, Ga.

VIRGINIA STATE DENTAL ASSOCIATION.

The fifteenth annual meeting of the Virginia State Dental Association will convene at the Atlantic Hotel, Norfolk, Va., Tuesday, October 14, 1884, and continue its sessions for three days. The North Carolina State Dental Association will meet with us, by special invitation.

Arrangements have been made for clinics by a number of distinguished operators from different sections of the country; also for the largest display of dental chairs, instruments, and appliances ever made in the State.

A cordial invitation is extended to all members of the profession to attend, with the assurance of a hearty welcome.

J. Hall Moore, *Corresponding Secretary*,
No. 104 Ninth street, Richmond, Va.

FIFTH AND SIXTH DISTRICT DENTAL SOCIETIES, STATE OF NEW YORK.

The Fifth and Sixth District Dental Societies of the State of New York will hold a union semi-annual meeting at Syracuse, on Tuesday and Wednesday, October 14 and 15, 1884.

The session will be called to order at 2 P.M. at the Empire House.

Applications for membership in either society should be made on or before the day of meeting to their respective chairman of the board of censors or the recording secretary. Both boards of censors will be in attendance to examine candidates for admission to their societies.

Members of the profession from other societies are cordially invited to be present and take part in the discussions.

G. L. Curtis, Syracuse, N. Y.,
Recording Secretary Fifth District.
E. D. Downs, Owego, N. Y.,
Recording Secretary Sixth District.

AMERICAN ACADEMY OF DENTAL SCIENCE.

The seventeenth annual meeting of the American Academy of Dental Science will be held in Boston, Mass., on Wednesday, November 5, 1884, at 3 o'clock P.M.

The annual address will be delivered by E. N. Harris, D.D.S., of Boston.

E. E. Hopkins, *Recording Secretary,*
No. 85 Newbury St., Boston, Mass.

EDITORIAL.

THE DENTISTS' BENEVOLENT ASSOCIATION.

On another page will be found a report of the first meeting of the Dentists' Benevolent Association. This organization has been in existence for about a year; is chartered under the laws of the State of Missouri, and has for its object the relief of the families of deceased members. The names of its officers are sufficient guarantee that the object will be faithfully carried out. The association had its incipiency during the discussion of the fund for the family of the late lamented Dr. Marshall H. Webb, and those most earnest in its formation were actuated by the hope of being able to meet the requirements of such cases in a more thorough manner and without unnecessary publicity. Those belonging to dental societies only are eligible to membership. Its officers perform their duties without remuneration, and will continue to do so while the association is in its infancy. We think the object a worthy one, and commend it to the attention of dentists who are thoughtful of the future and of the possibilities that may environ them.

ANOTHER UNIVERSITY DENTAL DEPARTMENT.

The Board of Regents of the National University, Washington, D. C., announce the opening of a department in that institution devoted exclusively to the science of dentistry. The regular course opens on the first Monday of October and terminates on the last Thursday in April. C. A. Von Hartleben, D.D.S., is the professor of operative dentistry, and Burrows Nelson, D.D.S., professor of mechanical dentistry. The other professorships are held by members of the regular medical faculty. The dean is Howard M. Barker, M.D., No. 1116 H street, N. W., Washington, D. C.

MEDICO-CHIRURGICAL COLLEGE OF PHILADELPHIA.

Dr. James E. Garretson has been elected president of this institution and professor of general surgery. The regular course commences October 1. Dentistry proper will not be taught, but Dr. Garretson expresses his intention to provide special facilities for graduates in dentistry to become oral surgeons.

BIBLIOGRAPHICAL.

The Formation of Poisons by Micro-Organisms: A Biological Study of the Germ Theory of Disease. By G. V. Black, M.D., D.D.S. Pp. 178. Philadelphia: P. Blakiston, Son & Co., 1884. Price, cloth, $1.50.

The title of this work fully describes the intentions of the author, who has endeavored, from the first page to the last, to present a clear and well-supported argument in favor of the theory enunciated. He says in the preface: "I have given only those experiments and observations that seemed important to a proper understanding of the subject, avoiding all but the most necessary details. * * * Many familiar names will be missed, for the reason that many have written * * * who have developed no distinctive fact or thought that is of service in the further progress of the subject. * * * The second part was written because I had something to say that I thought ought to be said at the present time."

The history of the germ theory of disease, as presented, is not a mere compilation, but is enriched by comments and an intelligent analysis of the work of each author, giving a comprehensive idea of the labors of each with the results accomplished. This résumé is very interesting reading, and is essential to the understanding of the main subject, developed more fully in the second part. Criticism is disarmed in acknowledging that "many familiar names will be missed," because, in his opinion, they have "developed no distinctive fact." In this, doubtless, he is mainly correct, and those who have had experience will sympathize with the difficulty of critically sifting out the perfect grain from the immense amount of chaff that has been written. There are some names, however, that might legitimately be added to this list.

The tendency of all writers on this side of the water is to magnify the labors of those in the Old World. It seems almost impossible for an original investigator in America to get a hearing, while any statement from the other side at once finds readers, and generally an appreciative audience. It may be safely asserted, without fear of successful contradiction, that had Dr. Miller, whose labor is so appreciatively noticed, performed the same remarkable work here that he has in Berlin, he would not be the center of the very active discussion he is to-day. The original labors of Drs. H. C. Wood and H. F. Formad, performed at the instance of the National Board of Health, in the research on diphtheria, and also the latter on "Bacillus Tuberculosis," deserve mention, as quite equal in importance and as carefully conducted as any in the same line of investigation. Dr. Geo. M. Sternberg is mentioned briefly in the body of the work; but his extensive labors in this direction deserve, it seems to the writer, more than a passing paragraph. This, however, is a defect not belonging peculiarly to this work or its author, but is part of a vicious national training.

Having "passed in review briefly the rise and progress of the germ theory of disease," the author sums up the principal points and concludes that, taking "all the foregoing together, there is strong presumptive evidence that all contagious and infectious diseases are produced by diseased germs."

To understand properly the second part, the following propositions must be read carefully as a basis:

"First. Experiment has shown that there are many micro-organisms which do not produce disease or injury; that the mere presence of these life-forms is not, in itself, a sufficient cause of disease; but that there are certain micro-organisms that uniformly induce disease when they are planted in or obtain entrance to the bodies of animals or men.

"Second. All through the experimentation that has been had on this subject, it has been noticed that poisons have originated in connection with the disease-producing organisms.

"Third. These poisons seem to be products of the organisms, and, while produced only in connection with the life and growth of the microscopic plants, may be separated from them; and, when so separated, produce direct poisoning, similar to that induced by the poisons from the higher plants.

"Fourth. This poisoning is different from the disease that is induced by the organisms, in that it is direct and comparatively immediate; while infectious disease arises only after a more or less definite stage of incubation.

"Fifth. Therefore, it is probable that each infectious disease is caused by a micro-organism that is capable of developing in the tissues or blood, and forming poisons through changes wrought in the molecular forms of matter, by virtue of its vital energies or the physiological processes of digestion, nutrition, and the formation of waste products."

Very few, it may be imagined, will dissent from the conclusion of the author when he says: "The germ theory of disease, as it stands to-day, is essentially a mass of unexplained facts, developed by direct experiment of the most subtle nature,—so subtle, indeed, that there are but few men who have the natural endowments and rigid training necessary to verify them in a manner and with the certainty that the thought of the time demands." It is this difficulty that meets all investigators in the low forms of life, and it is this fact that has made the acceptance of the theory largely dependent on manipulative dexterity. The accepted ideas of the day were impossible a generation back, and even now they are taken on faith by the mass,—faith in the recognized ability of the workers. When Dr. Williams came so near, in 1841, demonstrating the passage of the leucocyte through the wall of a blood-vessel, and which Dr. Waller subsequently (1846) fully described, there was no audience to receive the message, and it was left until Cohnheim had made his brilliant discovery for the announcement to startle the medical world. The circle of investigators had so increased that these discoveries were easily verified, and hence became the accepted thought. The germ theory has heretofore occupied precisely the same relation, and at no former period could it have been understood or accepted; and even now it will require many years of close observation and laborious work before its far-reaching influence in disease can be comprehended.

In the further discussion of the subject the author enters briefly into the consideration of digestion. Defining this, he lays down certain propositions:

"First. All digestion is accomplished by soluble ferments, elaborated by the organism, whether this digestion be accomplished in a stomach, alimentary canal, or elsewhere.

"Second. Digestion is three-fold in its forms: Primary, absorptive or resorptive, nutritive or assimilative.

"Primary digestion is the ordinary method by which food is fitted for reception by the organism. * * * Absorptive and resorptive digestion is accomplished among the ordinary tissues, by a soluble ferment elaborated by the tissues under special circumstances." The illustrations of this are "roots of temporary teeth, of bone during changes of form, and other tissues after their purpose has been served. * * * Nutritive digestion is performed within the tissues themselves and by them. It is the act of assimilation."

Under the heading of "Ferments" he defines what he means by "digestion without a stomach." This "is found in vinous fermentation, which is accomplished by the torula, saccharomyces cerevisia, or yeast-plant. * * * When pure vinous yeast is washed with distilled water, a peculiar substance is found dissolved in the water. This is yielded continuously during the life of the plant. Examination has proven this substance to be a soluble ferment, having a peculiar effect upon sugar. * * * It has been precipitated and obtained in the form of powder, somewhat similar to pepsin, and when redissolved has been found to retain its original action upon cane sugar. The action is to split up the sugar into two substances called glucose and lavelose. * * * This is entirely analogous to the digestion of food in the stomach of an animal, by which such food is received by the blood, to be conveyed to the tissues for their nutrition. * * * This is one instance of a type of digestion which I believe to be universal in case of all unicellular animals and plants. The formation of a stomach is a provision for the conservation of force, but it in no way changes the *modus operandi* of the digestive function."

The author alludes to certain experiments of Mr. Lister, wherein the latter found "it required several drops of tap-water (London hydrant water), in which there were bacteria termo, usually one or two or three in a drop, to start putrefaction in a blood serum, while the least possible portion of putrefying blood (containing, probably, no greater number of bacteria) would start it at once." The supposed explanation of this by Mr. Lister is given, but our author says in regard to it that, "in this paragraph we find a close statement of what seems to me to be the physiological fact in the case, only Mr. Lister seems not to have reached the point of recognizing the general physiological law appertaining to this subject." At the risk of extending this review to too great length, we quote Dr. Black in full, as this seems to be the groundwork of his argument: "I should explain the phenomena in this wise. The soluble ferment, diastase, or digestive agent given out by this bacterium must attain to a certain degree of intensity or concentration before it is capable of acting on blood serum. A single bacterium is incapable of forming a sufficient quantity of soluble ferment, when dissipated among the serum, to accomplish this digestion, and being incapable of appropriating the undigested material, dies of dyspepsia, while, if a large number are massed together, there is a corresponding concentration of the ferment-substance, the digestion of the serum is accomplished, and the colony will flourish. The serum is speedily decomposed.

"The soluble ferment of B. termo has been practically demonstrated by Wortman, who has shown that starch may be remoleculized by this organism, if no other source of carbon is available, and that, in this case, a diastase (soluble ferment) is secreted, which first transforms the starch into sugar (glucose), which is consumed by the bacteria as fast as formed. If a potato be boiled and a slice cut from it smoothly, to expose the surface, and this surface be exposed to the air for a few minutes, in order that a few germs that may be floating in the air may light upon it, and this be protected afterwards from other germs by a bell-glass covering, with sufficient water to prevent drying, there will be a development of clusters of bacteria lying upon the surface. In ordinary summer temperature this may be seen, usually after two or three days, as small points of varying colors. Now, if these points be removed, one by one, and examined with the aid of a microscope, it will be found that each little cluster is, as a rule, made up of micro-organisms of one distinct variety, but the different clusters will usually be of different varieties. Each of these has evidently developed from a single germ or spore which has happened to fall at that spot. By what means do these bacteria appropriate the starch of the potato to their nutrition? This material is not, as we know, in a state fitted for the nutrition of these organisms; nor even in a condition in which it can be taken up by osmotic action. The starch must be digested before it can be appropriated. That this digestion really takes place may easily be shown. If we prepare the potato as above described, watch it until the micro-organisms have grown to a greater extent,—until they have spread over the surface and the little clusters have coalesced with each other,—then cut a very thin slice from the surface and submit this to the chemical test, we will find that a part of the starch has been changed into glucose or some form of sugar. This change is the usual first act in digestion by plants, when starch is the substance acted upon, and is the primary digestion performed by the diastase, or soluble ferment, secreted by these organisms for the preparation of their food. This change goes on very rapidly, and the greater part of the sugar formed is at once appropriated to the nutrition of the organisms and its molecular form again changed. * * * This process will continue until every particle of the starch has been remoleculized. But this is only one of the series of remoleculizations which take place. The starch is converted into sugar, the sugar into tissue of the growing plants; and during all this process the plants are giving off waste products. These waste products mingle with the remains of the potato, giving to it its offensive qualities, and it is said to be rotting. We learn from this study that it is not necessary that food material be dissolved in liquid in order that it may be appropriated by bacteria."

The subject is further elaborated in the "growth of plants," "sprouting of seeds," etc., and in the "Fifth Lecture" reference is again made to the yeast-plant, "for comparison." "In this case the waste products are alcohol and carbonic acid. One is the same as in the animal,—carbonic acid; the other is different. These waste products agree, in their effects upon the activity of the plant, with the waste products of the animal upon its life-force. Alcohol, in a certain quantity, stops the growth, the activity, of the yeast-plant which produced it; and, if sufficiently concentrated, destroys it. Urea does the same for animal life.

"These excreting products differ widely among the lower forms of life; and yet, as we shall show in another lecture, retain a constant resemblance.

"In case of the mycodermi aceti, the acetic acid plant, the excretory products are carbonic acid and acetic acid. With the bacteria termo the excretory products are very complex, consisting of ammonia, sulphuretted hydrogen, and other ill-smelling products of putrefactive fermentation. Some of the mucidines excrete butyric acid."

The examination is further continued through "cellular digestion in the higher animals," "resorptive digestion," "digestion of blood-clot," "digestion of ligatures," "digestion of sponge," "necrosed bone," etc.

Under the heading of "Soluble Ferments" he says: "We have said enough to indicate the mode of action of bacteria in destroying substances in generel and in causing disease. Some forms may possibly cause disease by their presence, by aggregating into groups and causing irritation, like the animal parasite, as the itch-mite; but we are persuaded that their general mode of action is through their soluble ferment and the toxic properties of their waste products, to be examined presently. In this manner the hardest substances are made to yield,—are melted down almost as readily as softer materials. Soluble ferments do not depend for their dissolving power upon either acidity or alkalinity. Some are acid, but generally these reactions are not very marked, and normally seem capable of considerable variation. They seem to be Nature's solvents, manufactured by the life-force and used for the maintenance of the creature."

From what has been quoted it will readily be surmised that the author, in his treatment of the "Germ Theory of Caries," in the appendix, applies the views to its solution. After giving full measure of credit to Dr. Miller, he says: "In a previous lecture we have dwelt at some length upon the digestive fluids of living organisms. Unexpectedly we find use for these ideas now, for they were written before we saw Dr. Miller's last article. I have explained how it is that dead bone, roots of the temporary teeth, ivory driven into the flesh, catgut ligatures, sponge, etc., are dissolved and removed by a soluble ferment. I have also shown that the soluble ferment of the yeast-plant has been found and proven; also that of ammoniacal fermentation, and how plants take up otherwise insoluble substances. Now, this widening of the tubules is a conceded fact. It is also shown that it is not done by the lactic acid, in case of other experiments, nor can it be done by the physical force of the organisms; but it can, in all probability, be done by the digestive fluid of the organism."

Again, on page 163, he writes: "If micro-organisms cause an illness, a fever or an inflammation, it is because that organism, in its remoleculizations of matter, elaborates a toxic substance capable of producing these results. What is the source of the greater number of the toxic substances known and used in the medical world today? Take strychnia, opium, quinia, rhubarb, aconite, veratrum, atropia, nicotine, and a host of others,—are they not the results of remoleculizations by the life-force, as manifested in plants? Then take alcohol, ammonia, succinic acid, propionic acid, lactic acid, and many other toxic and irritant substances,—are they not the results of remoleculizations brought about by the life-force as manifested in the form of micro-organisms? Does any one pretend that all the toxic bodies elaborated by micro-organisms have been found, and their effects on the animal economy made out? Certainly not."

This must close the quotations. That they fail to do justice to the author is admitted, for that is always difficult, and especially so when the work is a continuous argument, one page elucidating another.

The book, though small in size, barely 169 pages, is one of the most suggestive that has come within the notice of the writer of this review. While the author does not "put forward his own experimentation," it is clearly evident that every line has been inspired from laboratory work. This gives it force and character, and it will be a matter of surprise if the conclusions fail to make the impression that they undoubtedly deserve. The work should be in the hands of every one desirous of having an intelligent comprehension of a subject now, more than aught else, agitating and influencing the medical thought of the age. J. T.

ON A NEW METHOD OF RECORDING THE MOTIONS OF THE SOFT PALATE. By HARRISON ALLEN, M.D., Professor of Physiology in the University of Pennsylvania. Extracted from the Transactions of the College of Physicians of Philadelphia, Third Series, Vol. VII. Octavo, pp. 34. Philadelphia: P. Blakiston, Son & Co., 1884. Price, cloth, 50 cents.

The author has in this paper presented a new method of recording the motions of the soft palate. The apparatus used is described and illustrated, while forty-six diagrams represent the tracings made in a variety of palate-motions. His principal object was to indicate the medical uses of this method of studying palatal motions; but, as he suggests, the method may have a wider range of application, such as the study of stammering, the comparative study of language, the instruction of the deaf, and the formation of a system of logography, or shorthand writing. To the dentist, a special interest would be found in this method of studying palatal movements with a view to the correction of congenital and acquired lesions.

HAND-BOOK OF THE DIAGNOSIS AND TREATMENT OF SKIN DISEASES. By ARTHUR VAN HARLINGEN, M.D., Professor of Diseases of the Skin in the Philadelphia Polyclinic and College for Graduates in Medicine, etc. With two Colored Plates. 282 pp. Philadelphia: P. Blakiston, Son & Co., 1884. Price, cloth, $1.75.

This volume, as stated by the author in his preface, is intended to meet the wants of the practitioner as a work of ready reference. It is not specially adapted to students of dermatology, because of the absence of any discussion of pathological anatomy and but brief allusion to etiology; but for the practitioner, the alphabetical arrangement, the lucid description of the diseases, and the plain and intelligent directions for treatment make it the most convenient and useful book of its class of which we have any knowledge. An Appendix contains dietetic directions in diseases of the skin. A full alphabetical table of contents, in accordance with the arrangement of the book, makes each subject easy of reference.

TEXT-BOOK OF MEDICAL JURISPRUDENCE AND TOXICOLOGY. By JOHN J. REESE, M.D., Professor of Medical Jurisprudence and Toxicology in the University of Pennsylvania, etc. Pp. 606. Philadelphia: P. Blakiston, Son & Co., 1884. Price, cloth, $4.00; sheep, $5.00.

This text-book, the author informs us, was written especially to meet the wants of students of legal medicine. He has endeavored to condense in a handy volume all the essentials of the science. In forty chapters the various topics are presented in concise but comprehensive form. Considerable space has been accorded the subject of toxicology—a subject with which the author has been identified for a number of years. The style in which the book is written is simple,—the meaning of the writer conveyed in a direct and plain manner. The paper and typography are unexceptionable. We commend the book as a valuable compend.

Pamphlets Received.

Recent Wonders in Electricity, Electric Lighting, Magnetism, Telegraphy, Telephony, etc., including articles by Dr. Siemens, F.R.S., Count du Moncel, and Prof. Thompson; edited by Henry Greer, member of the New York Electrical Society, etc.; illustrated; 120 pp. New York: College of Electrical Engineering, 1884.

Microscopical Studies upon the Absorption of the Roots of Temporary Teeth; Whitney Memorial Prize Essay of the Dental Society of the State of New York, 1884; by Frank Abbott, M.D. Reprinted from the "Independent Practitioner." New York: Dental Journal Association, 1884.

Transactions of the Dental Society of the State of New York, at its Sixteenth Annual Meeting, at Albany, N. Y., May 14 and 15, 1884. Rochester, N. Y.: Post-Express Printing Co., 1884.

HINTS AND QUERIES.

Inexact Notation.—Dr. Harlan, in his paper on "Pyorrhea Alveolaris," read before the American Dental Association at Saratoga, and published in the Dental Cosmos for September, gives the symbol of oxygenized water as H_2O_2. In that he is correct; but in the next sentence he says "any guaranteed peroxide of hydrogen may be used." Now, H_2O_2 is not a *per*oxide at all. Since the value of oxygen has been advanced to sixteen, or doubled, water is not now the protoxide HO, but, according to the old system, really a suboxide H_2O, while the peroxide, formerly written HO_2, becomes the protoxide H_2O_2 or HO. I think it very unwise to mix the old and new atomic measures thus. It gives wrong impressions to the young and misleads the old practitioners, who are not well versed in chemical notation.

It may not be amiss to call special attention to some of the properties of this valuable remedy. This substance has been obtained only in the liquid form, and, though differing from water only in containing an additional equivalent of oxygen, it has never been frozen by any degree of cold, is more slowly volatilized than water, and explodes violently when heated or brought in contact with finely-divided gold, silver, or platinum. It acts powerfully upon the skin, producing a prickling sensation, whitening the surface, and destroying the skin if kept in contact with it too long.

This correction, I hope, will lead the practitioner to be more cautious in its application than if it were merely H_2O.—W. J. HEWES, D.D.S., *Troy, N. Y.*

GOOD RESULTS.—How shall we best obtain good results? Certainly not by crimination and recrimination of respective modes of practice. A good result in any line of business is the essence of science, and cannot be greatly improved upon. Whether we fill teeth with gold or any other accredited material, it matters not, provided the result obtained is satisfactory; nor does it matter as to what particular form or shape of gold is used, so it is well used and success is the result. *Cylinders* are a success in some hands; so with any other form of gold now known to dentists for filling cavities. Then why be so controversial and contentious about particular modes? Let the aged and experienced, if doing good work, be satisfied to continue their respective lines of action (respectful of every feature of progress in theory and practice), striving to do better work every day, and there will be no cause for complaint, and the younger members of the profession will have noble examples to pattern after.

Two practitioners of dentistry may be located side by side in any town or city, differing widely upon general principles of practice,—one thoroughly eclectic and conservative in every feature of practice, the other extremely radical, operating daily upon the one-idea line, that nothing in practice is right but his particular mode; yet both may be useful in the community, and render efficient and entirely satisfactory service to patrons, and each stand deservedly high in the estimation of professional brethren and of the public. Why, then, differ so widely in society discussions and brand one another as unscientific and behind the times? "By their fruits shall ye know them." If it is a fact not to be disputed that Prof. James Taylor, of Cincinnati, and hosts of others, well tried and true in the practice of dentistry, can and do succeed in the use of hard-rolled cylinders in filling teeth, why should members of the Odontological Society of New York or of any other society condemn and ridicule such practice? What more can or do they accomplish by different modes? And if it be possible for Dr. Rich, of New York (of acknowledged ability and skill), to insert into an approximal cavity and unroll or separate the layers of a soft-rolled cylinder and pack gold between the layers successfully, as proclaimed in the meeting of the Odontological Society, March, 1882, who shall object or condemn? Good results should be our aim in the practice of dentistry, and with the very least expenditure of time, money, and discomfort to our patients.

Some dentists use gold exclusively in filling teeth; others use gold, tin, amalgam, cements, and gutta-percha. Some fill root-canals with gold; some with plastics, cotton, etc.; others with wood pegs (Dr. F. Y. Clark's practice eighteen or twenty years ago, and recently recommended by Dr. George A. Mills), and others decline to fill with anything, and universally leave the roots empty, each and every one possibly obtaining satisfactory results. Why, then, condemn one or the other?—a custom much indulged. Good results are what we want. Let us obtain them as best we can, and dispense freely our experience and modes of practice to each other in brotherly kindness, for the advancement of our profession and relief of human suffering. "By our fruits will we be judged."—B. F. A.

THE INTERNATIONAL TOOTH-CROWN COMPANY'S CLAIMS.

The case of the International Tooth-Crown Company vs. Berkowitz & Muller was heard by Judge Wallace, in the United States Circuit Court for the Southern District of New York, September 17. It is of great importance to the dental profession.

Mr. Dickerson, for the company, moved for an injunction against the defendants under the C. M. Richmond tooth-crown patents, the Low bridge patent, and the A. S. Richmond bridge patent.

The motion was opposed by Mr. S. J. Gordon, for defendants, the principal witnesses being Dr. A. S. Richmond, as to the facts concerning the date and use of the alleged inventions, and Drs. Dwinelle, Northrop, and Kingsley as experts upon the state of the art and the scope of the alleged inventions.

The C. M. Richmond and Low patents were invalidated, and the profession has nothing more to fear from them. The decision as to the A. S. Richmond bridge patent was reserved for consideration.

It may be regarded as open to all to place artificial teeth upon a bridge supported by *one* Richmond crown or cup. The patent is for such a bridge between *two* Richmond crowns or metal cups, covering roots at each end of the bridge.

A desperate effort will be made to sustain this patent, which seems to be the only thing left of any importance to the company.

Any dentist in the United States who placed a bridge, sustaining porcelain teeth, between two cups or caps covering roots, before August 8, 1882, can aid materially in defeating that patent by sending his address to Mr. S. J. Gordon, at No. 44 East Fourteenth street, New York, and stating the time when it was done.

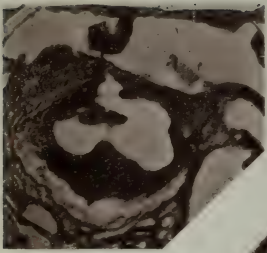
The case is of yet greater importance to parties who have been so unfortunate as to take licenses from the complainant company.

The defendants were licensees whose licenses had expired before suit brought, and it was contended that they were estopped, by the stringent and peculiar provisions in the licenses, from showing that they were a fraud on the part of the party obtaining them, and therefore void, or that the patents were invalid because the covenants of the license were that they would never at any time deny or contest their validity.

This grave question is also reserved by the Court for consideration; but great confidence is felt that the Court will never enjoin any parties under patents which it has decided to be invalid, and concerning which the proof was positive that the party obtaining the patents and the licenses knew that the patents were illegal when obtained, and that a great fraud was practiced upon the Government and the public by procuring and seeking to enforce them.

William H. Dwinelle,
President American Dental Protective Union.

PLATE I.



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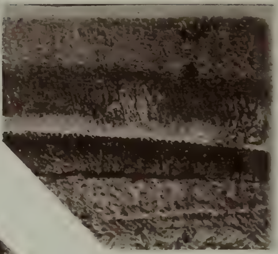

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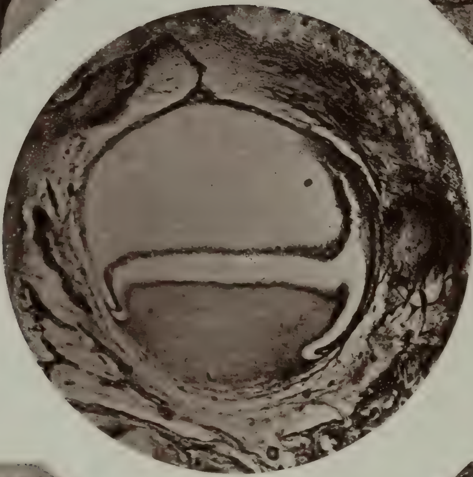

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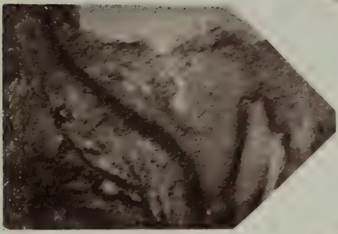

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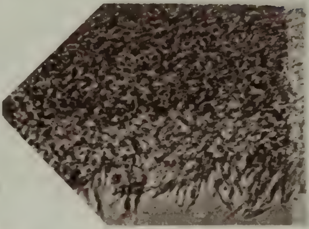

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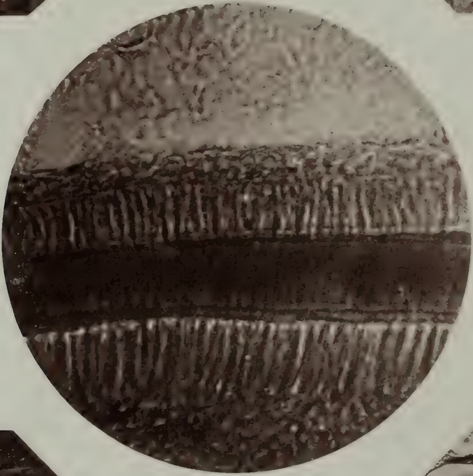

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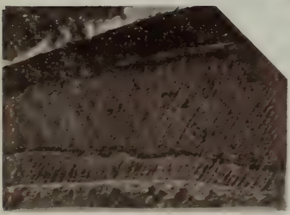

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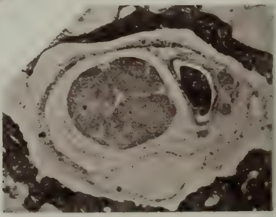

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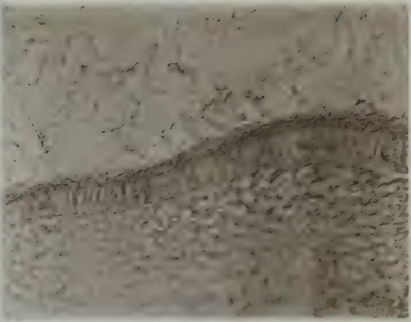
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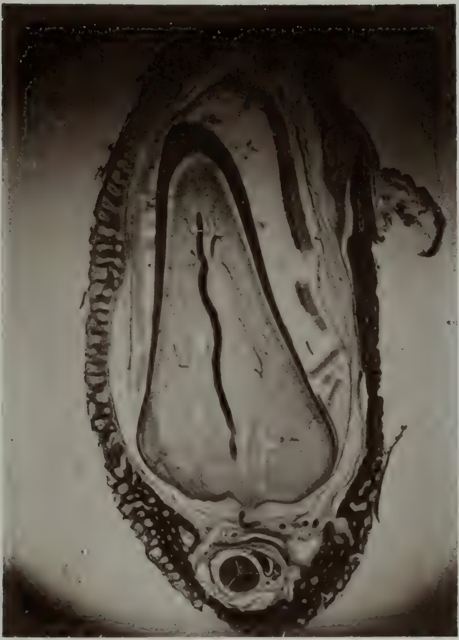
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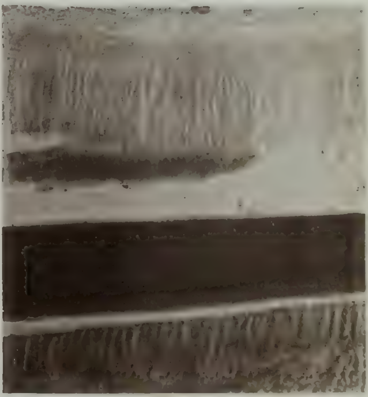

THE

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ORIGINAL COMMUNICATIONS.

ON CERTAIN DISPUTED POINTS IN THE DEVELOPMENT AND HISTOLOGY OF THE TEETH.

BY J. L. WILLIAMS, D.D.S., NEW HAVEN, CONN.

(Read before the American Dental Association, at Saratoga, August, 1884.)

Mr. President and Gentlemen of the American Dental Association: The one thought which has been uppermost in my mind since the chairman of Section V. invited me to read a paper at this time has been in the form of a query, whether there would really be sufficient interest in this subject, on the part of the association, to warrant my occupying the necessary time to present the theme. Perhaps I ought not to have been troubled with such misgivings, but while it affords me a genuine pleasure to present to the profession the results of my labors in this direction, yet I think those matters which have a direct relation to the details of our daily office practice have a more decided interest for the most of us, and I have no desire to force myself upon an unwilling audience. I must conclude, however, that if the dental profession desires to know anything concerning this subject, it desires to know the truth; and the fact that I have been charged by those holding high positions as teachers with theorizing somewhat upon these matters and making statements which are not supported by facts is, in itself, perhaps, sufficient reason for my desire to present such evidence as I have in support of my position before the representative dental organization of the world. I shall therefore take up only such points in the history of the development of the teeth as are in dispute at the present time.

It would seem hardly necessary for me to disclaim any feeling of animosity or antagonism for the sake of disputation alone. I suppose I possess a certain amount of that intellectual pride which is common to humanity, and from which springs the gratification arising from the belief that the opinions which we hold are correct, yet I am certain that I would trample such pride in the dust instantly if I saw that it stood in the way of my acceptance of the truth. I must assume that my highly esteemed friend, Prof. J. E. Garretson, and others who have criticised my views are equally desirous with myself of knowing the truth; and while I suppose their belief in the certainty and security of their position has been productive of a feeling of magnanimous commiseration on their part for me, yet, if I have not completely lost all ability to interpret facts and perceive truth, I shall to-night present such evidence of the correctness of what I have previously said upon this subject as shall place my position beyond all possibility of disproof or doubt.

This subject is one which must depend largely upon illustration for its intelligent presentation. This being true, there appears the possibility of the imagination of the artist entering as an important factor in the work of illustration. This becomes especially important when there is great difficulty in tracing the continuity and relation of tissues. We have a striking example of this in Dr. Abbott's chart representing a section of a central incisor with its surrounding tissues. In this chart the odontoblasts are represented as round or oval plastids or cells, between which the dentinal fibrillæ pass to a connection with non-medullated nerve-fibers,—an error which has arisen from the extreme difficulty in preparing specimens in which the continuity of the tissues can be traced. This led me to look for an artist in whose illustrations there should be an absence of all sentiment and imagination, who should be no respecter of persons, and the truthfulness of whose work no one should dare question. In the pure sunlight of heaven, whose swift pencils wrought many of the illustrations which I shall present to-night, in a space of time not exceeding the interval between the diastole and systole of a human heart, I found the agent to do my work. While the possibilities of photography are limited, within that limit there is nothing but the truth pure and simple. The photo-micrographs presented to-night were all made from actual sections cut from the jaws of human and animal embryos. The sections from which the photographs were made will be placed under the microscope for your examination after the reading of the paper. I invite the most critical examination of these slides, knowing that the more critically they are examined the clearer will appear the elucidation attempted upon the screen. In fact, I desire to depend upon what shall appear upon the screen only so far as is necessary to make plain what can really be seen under the microscope. I must add just a few words about the quality of the photo-micrographs. They were made without either a heliostat, substage, or a bull's-eye condenser, all of which accessories I should have had, but could not procure them in time for the work. They are not, therefore, quite as sharp and brilliant as I could wish, but perhaps sharp enough to prick some of the imaginative and "philosophical" bubbles of my critics. I have here on the desk before me a reprint from the *Dental Practitioner.* The title of the paper is "Development of Enamel Similar to other Epidermoid Structures." The paper presents a ludicrous and also a sad aspect. Ludicrous, in that the accidents due to a lack of skill on the part of the gentleman who mounted the specimen from which the drawings were taken are made to do duty as an explanation of a preconceived hypothesis which never had any foundation in fact. Sad, in that so little is really known concerning the histo-genesis of the teeth; that it is possible for a man to present such a paper as this to the profession without ruining his reputation as a histologist; and more lamentable still is it to find this dignified nonsense indorsed by the president of the Philadelphia Clinical Society, "an expert pathological and histological microscopist, and a gentleman whose learning and scientific attainments will not be questioned," says the author of the paper; all of which may be true as applied to the gentleman in his legitimate sphere, but the little that appears in this paper contains evidence that his opinion concerning the formation of enamel is of no value whatever.

During the discussion following the paper which I read before the New England Dental Society, at Providence, last October, it was privately remarked that it really was a matter of little importance whether this theory or that of the development of the teeth were true. It would probably be entirely out of place for me to discuss that question here. I must believe that gentlemen who travel the length and breadth of a continent to confer with each other concerning what is latest and best in the thought and practice of their chosen profession do regard this subject as one of the important foundations upon which the scientific status of dentistry rests. The man who does not admit this has a very narrow and dwarfed conception of the possibilities of modern dentistry. Do you think Dr. Atkinson would have dared undertake that brilliant operation which has resulted in the union of several fractured teeth, but for his knowledge of the minute structure and functions of the tooth-pulp? Most assuredly not. Under all circumstances, the man who is master of the situation is the one who best understands the nature and resources of the material which he has in hand. This being admitted, then it is a matter of vast importance that we know who is right and what is true about tooth-structure and development. It is a matter of importance that students should be correctly taught concerning these subjects.

It is the object of this paper to point out four important fallacies which are taught at the present day concerning the development and structure of the teeth. To this end I shall demonstrate that the teeth are not developed as papillæ in a groove; that there is an enamel-pulp or organ which has a definite function; that the formation of enamel is from the line of its union with the dentine outward, and that the odontoblasts are of the nature of ganglionic elements, sending processes outward into the dentine, backward into the substance of the pulp, and probably also laterally connecting them with each other. In answer to the query why these points have not been established before, I can only say that the subject is an exceedingly difficult one to investigate, and, so far as I know, the specimens which are presented for your examination to-night are the first and only ones which have ever been produced showing the natural relations of all the dental tissues to each other and to their surrounding tissues without break in their continuity.* It has cost me years of study and experiment and the expenditure of hundreds of dollars to accomplish the work the results of which I am to show you to-night. You will pardon me, therefore, for my disposition not to readily yield what this long course of study has taught me to those who pin their faith to "philosophical" deductions, or a few worthless microscopical specimens sent them by some commercial dealer. The fact that I have already criticised Prof. Garretson's hypothesis of the development of the teeth, and that the author of the paper referred to is chief of the clinical staff of the Hospital of Oral Surgery of Philadelphia, of which Prof. Garretson is the surgeon in charge, leads me to believe that this brochure is in the line of a defense of Prof. Garretson. The photo-micrographs at hand enable me to refute the teaching of Prof. Garretson and others, that the teeth are developed as papillæ in a groove, which is called the "primitive dental groove," in a much more effective manner than I was able to do in my review of his address in the *New England Journal of Dentistry*, and the more recent series of articles in the Dental Cosmos. As an evidence that I desire to render full and complete justice to Prof. Garretson and my distinguished opponents, I propose to present photo-micrographs which I think I may safely claim are equal, if not superior, to any illustrations which have ever been produced in support of their hypothesis. I shall first, then, proceed to show you actual photographs of sections of the jaws of human embryos, which present the "primitive dental groove" of Prof. Garretson and the older writers with diagramatic clearness.

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* Since the reading of this paper I have had the pleasure of meeting Dr. W. X. Sudduth, the author of the excellent article on "Dento-Embryonal Histology," which is completed in this number of the Dental Cosmos. It is gratifying to know that the results of his extended studies, which were completed in the finest histological laboratory in the country, are in such almost perfect agreement with my own observations. This becomes especially significant when it is known that he had no knowledge of my work until his own was nearly or quite completed.

You have on the screen (Plate 1, Fig. 1) a photograph from a section cut through the face of a human embryo at about the eighth or ninth week of intra-uterine existence.

Here we have the "primitive dental groove" in which is seen the developing tooth-germ with the so-called "tunica reflexa" about folding over it, leaving the space in which the enamel is developed. Does it not seem to be a perfect illustration of the hypothesis? It may be a "thing of beauty" for the moment to those who have fondly cherished a belief in a "primitive dental groove," but it certainly is not destined to be a "joy forever." The photograph is from one of the first specimens which I prepared, and was mounted several years ago. Every process in its preparation was carefully conducted according to the authority of "the most celebrated and expert slide-makers of Europe," and with what results? Why, all of the delicate superstructure above the so-called "basement membrane," including the enamel-pulp, was destroyed, leaving the appearance as shown. The slide possesses no value whatever. I say no value, but perhaps it may be said to have an historic value, in precisely the sense that the implements of the stone age, while possessing no intrinsic worth, yet have an historical value, as showing the benighted condition the race was once in, and the progress which has been made since that time. Let me now call your attention to photomicrographs taken from specimens mounted after different and better methods.

This view (Plate 1, Fig. 2) shows the first observable differentiation which marks the commencement of the process of dentition. In former papers upon this subject I have said that "if an imaginary line be drawn through the cuboidal layer of epithelial cells directly over the position which will be occupied by the future jaws of the embryo, it will represent the first observable indication of the development of the teeth. These cells, in obedience to the law of typal requirement, begin to proliferate and increase rapidly in size. This growth forces the columnar layer downward and the flat layer upward. This upward bulging forms a band running around the entire surface of the jaw, and is the *bourrelet* of Legros and Magitot, while the downward curving of the columnar layer gives, in transverse section, the V-shaped appearance," as shown in this photograph.

The removal of the delicate embryonal layers of epithelium by the older methods of preparing specimens leaves the "primitive dental groove" as shown in the preceding illustration. From the inside of this band there grows downward or upward, as the case may be, a thin lamina, from the free edge of which arises the epithelial cords, which, penetrating deeper into the substance of the jaw, enlarges at its lower extremity, forming the enamel cap within which is developed the enamel-pulp. I wish to compare this photograph with the illustration which will follow upon the screen, for the purpose of demonstrating that in point of fact and principle I have shown nothing in my drawings which may not be seen in the photographs from the specimens. (Photographs were then shown of illustrations of former papers by the author in the DENTAL COSMOS.) And now, just a few words concerning the enamel-pulp or organ, before proceeding to review the paper of which mention has already been made. The existence of this important feature of a developing tooth is denied by Prof. Garretson and others, for the reason, I suppose, that their hypothesis makes it necessary that there should be no enamel-pulp.

Gentlemen, the view on the screen (Plate 1, Fig. 3) speaks a hundred times more effectively than any arrangement of words, and forever sets at rest this question of an enamel-pulp. This is a photo-micrograph from a section through the jaw of a human embryo, showing the development of a temporary molar. You will observe that the enamel-pulp is in accordance with what I said in my review of Prof. Garretson's address at Providence, the largest and most conspicuous feature of the tooth-germ in its earlier stages.

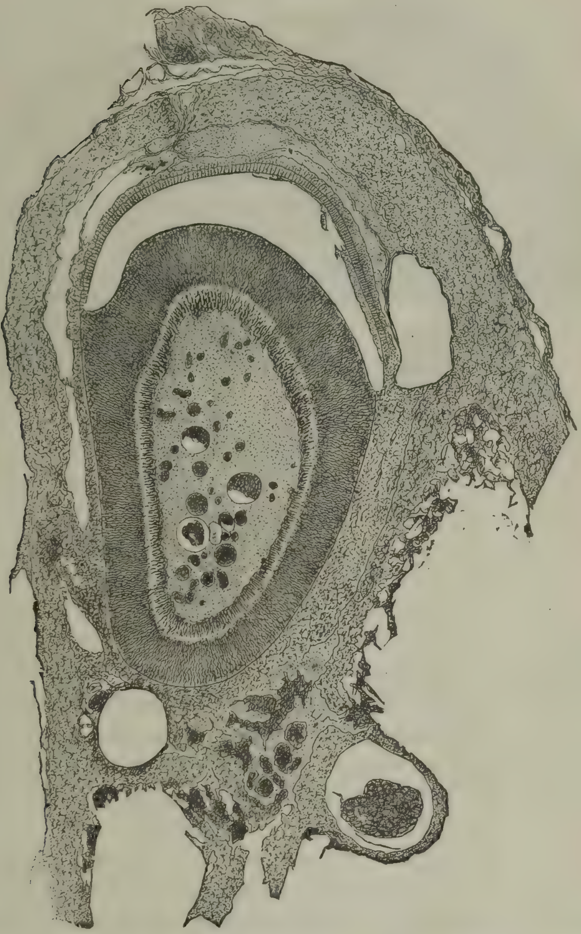
As I shall refer to this subject again, I leave it for the present, while I give a few minutes' attention to the paper to which I have already referred. This reprint is largely composed of quotations from different authorities, with comments upon them as to the manner in which hair, skin, hoofs, and horns are formed; an extract from Legros and Magitot; the views, to the extent of half a page, of the expert microscopist already referred to; a brief comment on one of my drawings taken from the DENTAL COSMOS, and a little more than a half page by the author on the formation of enamel, the subject proper of the paper, and the most of this half page is a description of a drawing made from a slide mounted by Cole, of London. Assuming that the drawing is a fairly good representation of the slide, it is of but very little value, and the description shows a ludicrous misrepresentation of the little that really can be seen. It is a favorite method with many dialecticians who find a weak cause on their hands to defend, to assume, in a few skillfully arranged sentences, that the hypothesis which they are trying to establish is similar to or identical with, in its relation of principles, some other well demonstrated and generally admitted theory. The most of the time occupied is consumed in dwelling upon the major premise of the argument, which may be nearly or quite self-evident. The mind of the reader or listener is forcibly impressed with the truths presented, and then the minor premise and the inferences or conclusions are rushed in with the flourish of a few well-rounded sentences, and the hearer is overwhelmed before the mind has had time to recover its critical equilibrium sufficiently to see that there are several missing links in the argument. It is a kind of logical trick similar to those with which the Greek school of sophists were wont to amuse themselves. This is quite the case with the paper of which I am speaking. The scheme of argument presented in this paper might be stated as follows: Hair, nails, hoofs, and enamel are epidermoid structures. All epidermoid structures are developed in the same manner. Ergo, the process of the development of hair and enamel is identical. Now, the weak point in the argument arises in the minor premise, which asserts that all epidermoid structures are developed in the same manner, which is very far from the truth. Scales, hair, feathers, nails, horns, hoofs, the enamel of the teeth, the sweat-glands, the sebaceous glands, and the mammary glands are all derivatives of the epidermis, but they are not all developed in the same or even in a similar manner. I have frequently urged the importance of some knowledge of comparative embryology in the study of these formative processes. It is impossible to grasp in a rational manner the significance of the intricate unfoldings in the evolution of the higher forms of animal existence without having studied these processes as expressed in a more simple manner in the lower forms. It would be well for these gentlemen, who discourse in a very general way with such a show of profound learning about my reversing the formative processes, disregarding the general physiological laws, and dragging in a divine interposition, to at least give some little attention to the rudiments of these laws themselves, and ascertain, if possible, what they are talking about. There is something about the expression, "a general physiological law," which makes it a delight, to men who have only a scanty definite knowledge of a subject, to roll it as a sweet morsel under the tongue. A vast amount of ignorance has many times concealed itself behind "a general physiological law." A little definite knowledge at critical moments is of vastly more value and importance than volumes of brilliant generalizations, which may mean anything, but generally mean nothing.

The ostensible title of the paper in hand is "The Development of Enamel Similar to other Epidermoid Structures." The author would have succeeded much better if he had stuck close to his text.

But on page 6 of his reprint, and also on the tenth page, he emphatically declares that the law governing the formation of hair, nails, the cuticle of the skin, the shell of the turtle family, the hoofs of ungulates, and the horns of most of the ruminants, is precisely the same law which governs the formation of the enamel of the teeth. Now, that is precisely what it is not. How any man of sound mind, with healthy, active reasoning powers, could honestly assume that a tissue which is constantly being thrown off and replaced by new tissue—which, when lost, is replaced by a new growth, as is the case with most of the epidermoid derivatives—can be identical in its process of formation with a tissue which never grows after its typal limit is reached, which is never replaced when lost, is quite beyond my powers of comprehension. I might enter into an elaborate argument to show how utterly impossible it is on *a priori* grounds for the development of enamel to be identical with the formation of hair, but it is much the better way to come straight to the demonstrated facts.

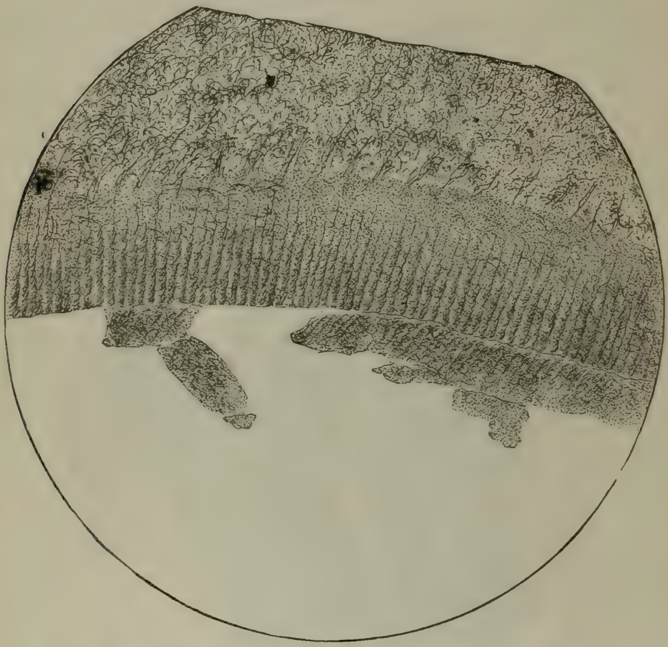
You have on the screen (Fig. 14) a photograph of the drawing in the brochure under consideration, made from the slide mounted by "one of the most celebrated and expert microscopical slide-makers in Europe." It is upon this drawing that he depends for the demonstration of his hypothesis. Now, what are the facts concerning it? It is worse than useless, in the sense that a perversion of truth is worse than the absence of truth. It is misleading to one who has not had experience in the preparation of sections of embryo jaws. It purports to be a section showing the temporary and permanent tooth-germ. The germ of the permanent is entirely absent, as is the enamel, with the exception of a few fragments which were formed on the dentine of the temporary tooth. These portions were probably torn out in the cutting of the section, or washed out in its preparation for mounting. The treatment necessary for the removal of the water from the tissues previous to mounting in balsam is such that many portions of embryonal and delicate structures are shrunken, distorted, and frequently almost completely destroyed. In this drawing the enamel-pulp, an exceedingly delicate tissue, is so nearly obliterated as to have little or no significance. The author says, in speaking of the space shown between the dentine and enamel, that it appears in my drawing, and that all good sections show it. Is a "good" specimen one in which all of the tissues are shown in an undisturbed relation? If so, then no good section shows such a space. It is shown in the drawing referred to, because in all of my drawings I have endeavored to faithfully reproduce the specimen from which the drawing was made, and, where there are defects in the specimens, those defects have been reproduced and explained for the benefit of those who are to follow me in this line of investigation. We sometimes learn more from the failures and defects in our work than we do from our successes, if we but keep our minds open to the reception of truth, at the expense even of a little injured pride. I shall show you photographs and microscopical sections to-night in which these dental tissues are in an undisturbed relation, and where, previous to the commencement of the formation of either dentine or enamel, the dentine-pulp and enamel-pulp are in perfect contact, and also specimens where the first faint lines of dentine and enamel have appeared, and these lines of dentine and enamel in perfect contact, with the ameloblasts everywhere plainly shown above the enamel. In all of the sections which I have cut during the past

FIG. 14.



year there is no appearance of a space between the dentine and enamel until the section is placed upon the slide and the cover-glass pressed down. Then the pressure quite frequently forces the tissues slightly apart. The second illustration of tooth-structure in this reprint is represented as a portion of the previous section more highly magnified (Fig. 15). There is no appearance of an enamel-pulp in this drawing, and what is intended to represent completely-formed enamel is really in the position occupied by the ameloblasts. Below these cells there are probably in the original section a few fragments of the broken and torn enamel. This specimen, as I infer from the text, was submitted to the aforementioned expert microscopist, who returned the following comments:

FIG. 15.



"A microscopic study of the section of embryonic tooth you sent me discloses the existence of a space between the dentine and enamel. At the base of the enamel, *i.e.*, the surface of the enamel-rods next to the dentine, there exists an apparent line or membrane. Below this line or membrane is a somewhat homogeneous or colloid-looking substance, evidently of much less consistence than the structure above. Above this line is the enamel more fully developed and already hardened." After stating that the supposed line or membrane was an optical delusion, due to angular displacement of the softer portions of the enamel, he further says: "The enamel is formed on the dentine, and develops and becomes indurated as it is elevated by the development of new structure below, precisely as in the case of epidermal cells. I believe the teeth to offer no exception to the general physiological law, and consider the doctrine which teaches that enamel is formed upon the dentine and grows by deposits from above as erroneous as the announcement that a membrane or line exists in the middle of the enamel-rods." Well, shades of Leeuwenhoek protect us! Such a complete misinterpretation of anatomical structure and physiological action can only find a parallel in the ancient doctrine of the "primitive dental groove." After stating that there is a space between the dentine and enamel, in which space no structure of any sort appears, and which, in the developing tooth is a closed cavity surrounded on all sides by solid walls of dentine and enamel, he proceeds to tell us that enamel is formed in that cavity. But how formed, and from what? He says it is formed at the surface of the dentine and pushed upward from below. There is indisputable evidence in the structure of enamel that it is formed from prismatic cells. But there are no cells within this space or closed cavity. It can hardly be possible that the writer did not know that there can be no formation of tissue without proliferation of cells or corpuscles. In the formation of other epidermoid structures there is a constant cell proliferation from beneath. But no eye ever beheld the enamel-forming cells in a section in which the tissues were in their natural relation, below the enamel and between the tissue and the dentine. They are always above it. After quite a lengthy quotation from Dean's translation of Legros and Magitot, the author of this reprint discloses the fact in a single sentence that he has never seen a well-mounted section showing a developed tooth. After referring to the analogy between the lower layer of cells of the enamel organ and the prismatic cells of the intestines, he says: "It is one more point in favor of my position, that the enamel is not built by deposits from above, but pushed upward by a multiplication of cells from below." It is much to be regretted that he ever made this statement, for it is certainly destined to bring upon him the most intense humiliation.

You have now upon the screen (Plate 2, Fig. 11) a photograph of a section of the jaw of a kitten at birth. The section, while representing an advance beyond those in which the "primitive dental groove" was so well portrayed, yet contains imperfections which make it of value in explaining some of the errors into which previous writers upon this subject have fallen. At the lower part of the view and rising upon either side is seen the inferior maxillary bone in transverse section. In the inferior parts of the bone is seen the medullary canal containing the nerves and blood-vessels. You will observe the very large proportionate size of the inferior maxillary nerves as shown in cross-section. Rising immediately above this, and occupying the larger part of the interior of the jaw, is shown the developing temporary tooth, to the side of which is seen the permanent tooth-germ. The cap of dentine is seen surmounting the pulp entire. But the thin line of enamel has been torn from its connection with the dentine and broken into fragments. Fortunately, however, while the space which it bears explains the space in Figs. 14 and 15, yet the structure of fully-formed enamel with the characteristic wavy lines, which nearly always run diagonally across each other at the tip of the cusps, is plainly seen in the lower side of these fragments, while the enamel-forming cells are clearly shown above. But a little farther down on the side of the developing tooth the tissues remain in their natural relations, giving a perfect refutation of the hypothesis taught by Prof. Garretson and others. First, we see the tissue of the pulp surrounded by the layer of the odontoblasts; next, the band of formed dentine upon which a thin line of enamel has been deposited. Above this narrow line of enamel are seen the ameloblasts, and outside of these cells the flat layer forming "Nasmyth's membrane," and farther beyond the enamel-pulp. That there may be no shadow of doubt about the position of these enamel-forming cells outside of the formed enamel, I have slightly torn the tissues at this point in several specimens (Plate 1, Fig. 5, and Plate 2, Fig. 13), so as to show the isolated ameloblasts, the characteristic shapes of which, once seen, will never be forgotten. The next view (Plate 1, Fig. 4) is a photograph under high power, taken low down on the left side of Fig. 11 (Plate 2), where the enamel has just commenced to be formed.

It would not seem as though any further demonstration in support of my views could be asked for. You observe at the lower part of the view the dentine pulp surmounted by the odontoblast layer, above which a line of dentine has been formed, and upon the dentine a very thin layer of enamel has been deposited. Then come the ameloblasts, or enamel-forming cells, in intimate relation with the enamel organ. We will project several more views upon the screen in further demonstration of this point. These photo-micrographs are from sections of both temporary and permanent teeth (Plate 1, Figs. 5–7). Plate 1, Fig. 8, is a more highly-magnified view of the lower part of Fig. 11, Plate 2. It shows the medullary canal with nerves and blood vessels. Observe the size of the inferior maxillary nerve and its tripartite division.

I think the most skeptical of my hearers must now be thoroughly convinced that the development of enamel is from the line of its union with the dentine outwards. Concerning the exact manner in which the formation of the enamel takes place, I cannot speak authoritatively. In every phenomenon of physiological activity there will probably always remain a deeper depth which the human mind cannot penetrate.

The fact, as I have before stated, that there can never be seen but a single layer of enamel-forming cells surmounting the enamel, leads naturally to the inference that amelification occurs by a secretion and deposit from these cells, and that, as the ameloblasts recede before the advancing formation of enamel, the fiber of the enamel-cell, which can plainly be seen projecting from the lower part next the line of formed enamel, remains as the persistent fiber of living matter which Dr. Bödecker has so ably demonstrated as forming an essential feature in the histology of enamel. It is also possible that the formation of the enamel may be by an intercellular deposit and gradual elongation of the cell upward.

It is not true, as asserted by certain writers, that this method of the formation of enamel finds no parallel in epidermoid structure.

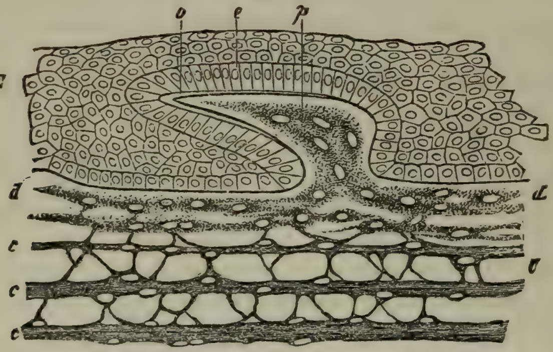
The process of the development of the placoid scales of the Elasmobranchii is almost identical with that by which teeth are formed. I quote from Hertwig and Balfour, than whom there are no better authorities in the world on this subject, who say, in speaking of these placoid scales, "They consist, when fully formed, of a plate bearing a spinous projection. They are constituted of an outer enamel layer on the projecting part, which is developed as a cuticular deposit of the epidermis (or epiblast), and an underlying basis of dentine (the lower part of which may be osseous)," corresponding, you see, with the cementum of the tooth, "with a vascular pulp in its axis."

The view on the screen (Fig. 16), of a vertical section through the skin of an embryonic shark, showing the development of one of these scales, might easily be mistaken for a developing tooth.

This brings us to a specific consideration of that "general physiological law" under which the development of the teeth and other epidermoid structures takes place. The author of the paper under review studiously, or possibly innocently and "without malice aforethought," avoided all mention of a very important group of the derivatives of the epidermis. We shall see that there may be endless departures from the modifications of that which is somewhat ambiguously spoken of as a "law" in the evolution of tissues. Now, those epidermoid structures of which mention has been made originate as local growths of the outward skin in an outward direction. The slight infolding of the columnar layer of the epidermis always maintains its relations with the adjacent cells of this layer around it.

The glandular group of the epidermic derivatives, of which no mention is made, originate as local growths of the outer skin in inward direction. They are characterized in the formative stage by a dilatation of the end of the ingrowing tube or cord of the epithelium from which the glandular part of the organ is developed. To this group belong the sweat and sebaceous glands, the tear glands, and the mammary glands. The formation of the enamel organ of the teeth, while not identical because of its slightly different functional purpose, very closely resembles the development of the skin glands. It was my observation of this fact which first led me to regard it as essentially glandular in its nature. Its process of growth in the early formative stages is the same. While the appendages which are outward growths begin as a shallow pouch or pocket in the outer skin, the development of the enamel organ and the glandular organs begins as an epithelial cord which descends by a more or less tortuous course deeper into the dermal tissues enlarging at the lower end. In the case of the enamel organ, this epithelial cord is severed from its connection with the external skin layer shortly after the commencement of the formation of the dentine pulp. The cord is completely broken up and disappears, and the enamel organ exists as an independent body, having no connection with the external skin layers. This one fact completely demolishes the argument of my critics of similarity or "general physiological law," for the hair pouch always maintains its connection through the outer and inner root sheaths with the external skin layer. Another proof of the glandular nature of the enamel organ is, that if it be removed in the early stages of the formation of the teeth, as can easily be done in the jaws of a calf, it will be found to be highly impregnated with lime-salts, which are being elaborated for the building up of the enamel. After the completion of the enamel at the tips of the cusps of the teeth, the enamel organ at that point is thus exhausted, but

FIG. 16.



still remains lower down on the sides of the tooth, where the deposit of enamel is not yet completed, until its perfect work is accomplished, after which it entirely disappears. The development of a tooth, then, is a modification of the methods by which both groups of the epidermal derivatives are formed.

The evolution of the enamel organ is a modification of the process by which the skin glands are developed. Unlike the formations of either group, it is developed in a closed sac which has no connection with the external skin layer. Later on in the process of development, and after the completion of the crown, the pericemental membrane makes its appearance, probably originating as a transformation either of the cells which constitute the lower part of the cap of the enamel organ, or those which form the lower part of the investing capsule or tooth-sac, and the connection of the tooth with the external skin layer is again established through the pericemental membrane. The formation and growth of the cementum of the tooth is thus seen to be a modification of the methods by which the outward growths of the external skin layer is effected.

My reference to the formation of embryonal corpuscles in the transition of the prismatic cells of the cap of the enamel organ into ameloblasts is spoken of as a kind of physiological necromancy, in which it is necessary to " wholly and completely set aside every law of nature." Well, this is not the first instance in the history of the world of men attributing to magic phenomena which they did not understand. If my critic has not watched the process by which a tissue returns to its embryonal condition, he certainly has much to learn concerning retrograde metamorphosis. This would hardly be the proper time for me to enter into a discussion of the processes of inflammation, but, so far as this wonderful and orderly provision of nature applies to the development of the teeth, I am quite well prepared to demonstrate everything which I have asserted. The photograph on the screen (Plate 2, Fig. 9) is from a section cut just prior to the commencement of the formation of either dentine or enamel. In the earlier stages *preceding* this the columnar layer of cells is plainly seen at the lower part of the enamel organ. But at this stage they have entirely disappeared, and from them there has been developed a sheet of round embryonal corpuscles. Those constituting the lower layer of this sheet are destined to develop into the ameloblasts proper, which, while somewhat resembling the original columnar layer, are quite different in many essential features, being the club-shaped, or larger at the ends and constricted somewhat in the center. This photograph (Plate 2, Fig. 10) is from the side of a tooth somewhat more advanced in development. Enamel has just begun to be formed at the top of the cusp or cutting edge. Farther down on the side, in the region from which this photograph was taken, the enamel-forming cells are just developing from the embryonal corpuscles. The upper portion of this sheet of embryonal corpuscles is developed into the flattened layers known as Nasmyth's membrane, which is clearly seen in any well-mounted specimen. (See also Plate 1, Fig. 4.)

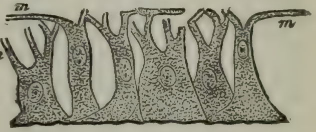
Leaving this part of my subject, I call your attention to the structure of that layer of cells surmounting the tooth-pulp, and known as the odontoblasts. You are all aware that Prof. Heitzmann and his pupils, Drs. Abbott and Bödecker, have represented these bodies as round or oval nucleated corpuscles, between which the dentinal fibrillæ pass. Dr. Abbott, I believe, has stated positively that the dentinal fibrillæ are direct prolongations of non-medullated nerve-fibers, and they are so represented in his chart. Dr. Bödecker has stated it as his opinion that there is a direct connection. I had long been perfectly satisfied in my own mind that they were holding erroneous views of the origin of the fibrillæ, but it was not until a few months ago that I succeeded in cutting sections so thin that but a single layer of odontoblasts was represented. These specimens have been examined by Prof. Heitzmann, Dr. Bödecker, and Dr. Atkinson. Prof. Heitzmann had hardly more than glanced at one of the sections, when, with that perfect frankness which is so characteristic of this noble searcher after Nature's truths, he admitted his mistake. Subsequently, while examining this specimen under my 1-25 inch objective, he thought he could detect very delicate fibers passing between the odontoblasts. But it is certainly established beyond all question that the dentinal fibrillæ proper are prolongations of the odontoblasts. The discovery that there are frequently two and sometimes three fibers projecting from a single cell, and that these cells are connected at their base by roots or processes with the reticulum of the pulp, and the fact that the pulp itself is a form of persistent embryonal tissue, as shown by the researches of Heitzmann and Bödecker, led me to the conclusion that they are a form of ganglion cell. The photograph on the screen (Plate 1, Fig. 6) is from the periphery of the pulp of a completely developed tooth. It is plainly seen that the odontoblasts terminate in fibers, and close examination reveals some of them dividing into two or three. But this point is so difficult of elucidation that I shall depend largely upon the sections under the microscopes for a perfect demonstration.

I have stated in my recent series of papers in the Dental Cosmos that, since the announcement of my discovery of the ganglionic nature of the odontoblasts, I have frequently been asked how I explain the formation of dentine. Do these cells perform a double use?

Are they elements of sensation, and also for the elaboration of the dentine? It would seem to be almost a self-evident conclusion that the material for maintaining the continued integrity of the dentine must be provided by these cells, for the living matter (the fibrillæ) which fills the canaliculi is a prolongation of these cells, as we have seen. If the supply of nutritive material for maintaining the continued integrity of the dentine comes from this source, why may we not logically infer that it was originally formed in this way?

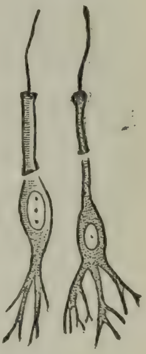
A study of the physiological significance of the primary germinal tissues again finds practical application here.

FIG. 17.



We have seen that in many of the low forms of animal existence, the tissues of which are represented in higher forms while in an embryonal condition, where differentiation has made little progress, a multiplicity of function is performed by the same elements or cells. Pulp tissue, therefore, being a persistent form of embryonal tissue, we should expect to find it performing a multiplicity of function. The odontoblasts, while composed of what is essentially neural matter, are probably at the same time the active elementary agents in secreting the material for the formation and continued integrity of the dentine. Such instances of multiplicity of function are by no means rare in the lower forms of functioning bodies. In the myo-epithelial cells of Hydra, as seen in the view on the screen (Fig. 17), we have an instance of contractile fibers originating in epithelial cells. In the Protozoa there are found elements which perform the function of nerves and muscles at the same time. In the neuro-epithelial sense cells of Aurelia Aurita we have almost a perfect duplication of the odontoblasts. These are specially modified epithelial cells of the digestive tract. "They consist," says Balfour, "of an outward process which is prolonged into a fine hair, while their inner extremity terminates in fine processes which join a delicate network of protoplasmic fibers." One might easily mistake this for a description of the odontoblasts. (Fig. 18.)

FIG. 18.



Gentlemen, I hope I have made these matters plain to you, and I trust the contribution will prove, for the honor of the profession which I love, some slight addition to our rather scanty knowledge of an obscure subject. I also trust that in what I have said I have given no cause for offence. I have spoken earnestly and somewhat pointedly because I could not but see that my critics seemed to hold the opinion that a knowledge which has grown out of the practical investigations of years could be brushed aside by a few hastily prepared conclusions, drawn from a superficial examination of inferior microscopical preparations. If they are willing to do the drudgery incident to this kind of work, and will go over the ground in the plodding manner that is necessary, I think we shall not be very far apart at the end. I now invite your attention to the exhibition under the microscopes, in which you will doubtless find the most interesting feature of the demonstration.

DENTO-EMBRYONAL HISTOLOGY AND TECHNOLOGY.*

BY W. XAVIER SUDDUTH, D.D.S.,

DEMONSTRATOR OF HISTOLOGY IN PHILADELPHIA DENTAL COLLEGE.

(Concluded from page 584.)

Sections from the jaw of an eight-centimeter pig show the process of invagination almost complete, the concave surface of the cup-shaped cord or enamel organ, as we will now style it, filled with the dentinal papilla or pulp. The interspace (Fig. 9, No. 1) between the two tunics is now occupied by a stellate reticulum, which I have no hesitation in saying is formed from the small round cells that were originally inclosed by the walls of the cord (Fig. 7, No. 2). These walls, as we have seen, are composed of the cells of the Malpighian layer. The enamel organ is still connected to the epithelium of the mouth by the neck of the cord (Fig. 9, No. 3). Springing up from the base of the pulp is seen a connective-tissue envelope, which is to inclose the enamel organ in a complete sack (Fig. 9, Nos. 6-6), the exact office of which is not fully understood. I hold that it plays an important part in the development of the cement.

What we have said thus far simply refers to the development of the temporary teeth.

At about the fifth month in the human, and in the pig ten centimeters long, we find a bud springing off from the side of the cord of the temporary tooth. This is to form the cord for the permanent tooth (Fig. 10, No. 3), which is to take the place of the temporary one. This budding arises from the lingual aspect of the neck of the cord and passes down on that side of the now fully-developed enamel organ of the temporary tooth. This description holds good for all except the cords of permanent molars. These arise from the distal face of anterior teeth, and pass down on the same side.

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* A portion of the text was omitted on page 582 of the previous number of the DENTAL COSMOS. It should read: "Vertical transverse sections of the band of the same-aged fetus show the band V-shaped in the anterior part of the mouth. The band or groove, filled with small round cells, is deepest at the anterior portion of the jaw, and gradually diminishes in depth until it disappears,—flattens out into the epithelium covering the jaws. This disappearance occurs at about the point where the cords for the molars arise. Sections cut from the anterior portion of the mouth show the band well defined, while those cut in the posterior portion will present no appearance of the band at any age, the cords for the temporary molars arising directly from the epithelium of the jaws."

Turning our attention now to the pulp, we find lying on its outer surface a row of cells called odontoblasts. From these the dentine is developed by calcification around the fibrils, which are thrown out from their outer periphery; calcification beginning at a point farthest from the pulp and proceeding inward, the fibrillæ remaining as the contents of the dentinal tubuli. The basement membrane, the presence of which is doubted by most observers, would lie between the odontoblasts and the cylindrical epithelium, which composes the inner tunic of the enamel organ.

As regards the development of the enamel, there are many theories. Some hold that the enamel is a differentiation of a dentinal basis; but the fact that calcification of both dentine and enamel, beginning at the same line, progresses in opposite directions, makes that ground untenable. Others hold that the enamel results from the calcification of the enamel-cells themselves. From a casual examination this does appear to be so; but if such were the case, then at the beginning of calcification the enamel cells should correspond in length to the length of the developed enamel prisms, and the decrease in the length of the enamel cells should be commensurate with the increase in the thickness of the enamel, or the enamel-cells should extend on themselves as calcification progresses, which phenomenon has not been established. It is asserted that the multiplication of the ameloblasts in the direction of their length is from the cells of the stratum intermedium as rapidly as calcification occurs at their free ends; that is, the calcification of the cell-body at one end and the building up at the other is made a consequent necessity. It is admitted, however, that, before the formation of the enamel is

FIG. 9.

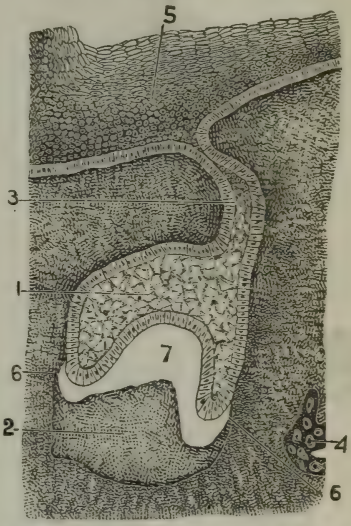


FIG. 9. Vertical transverse section of jaw of 8-centimeter pig. 1. Enamel organ. 2. Dentinal papilla. 3. Neck of enamel organ. 4. Hyaline cartilage. 5. Epithelium of mouth. 6-6. Connective-tissue processes arising from sides of dentinal papilla to form cement organ. 7. Space caused by shrinkage of pulp.

completed, "the *epithelial* or *gelatinous* tissue undergoes atrophy." This atrophy of the stratum intermedium occurs at about the fifth month in the human fetus, when only a very thin layer of enamel is calcified.

FIG. 10.

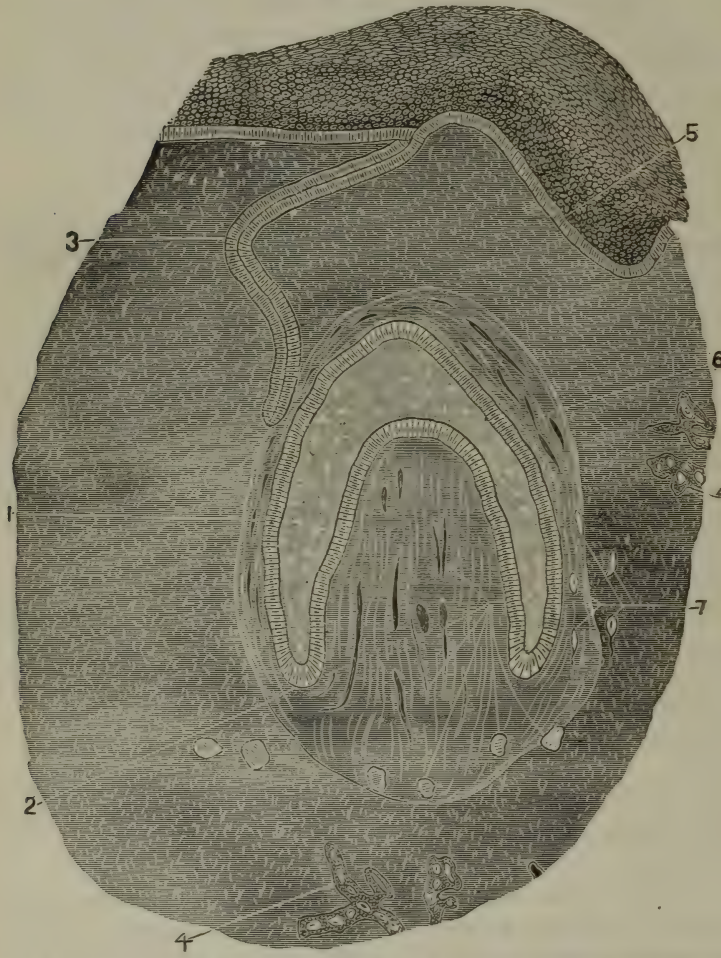


FIG. 10. Vertical transverse section of jaw of pig, 10 centimeters long, injected, showing blood supply to enamel and cement organ. 1. Enamel organ. 2. Dentinal papilla or pulp. 3. Cord for permanent tooth. 4. Hyaline cartilage. 5. Epithelium of mouth. 6. Connective-tissue envelope or cement organ. 7. Blood-vessels. (These are represented by the dark lines, and are seen in both the pulp and cement organ.)

Those who hold to the theory of the direct calcification of the enamel-cells must seek for a new supply of "*epithelial* and *gelatinous*" tissue to lengthen the cells for the calcification of the remaining thickness of the enamel, which is by far the greater part. If the ameloblasts are directly calcified, it is the only place in normal development of tissue where calcification of cell-body does occur. In the development of bone the osteoblasts do not become calcified, but the lime-salts are deposited around the spherical osteoblasts in the form of spherules, increasing in thickness from within outward, and, thus approaching one another, they coalesce. The osteoblasts persist as the lacunæ; their connection with neighboring lacunæ forming the canaliculi, and the capillary blood-vessels around which the osteoblasts are arranged become the Haversian canals.

Fig. 11.

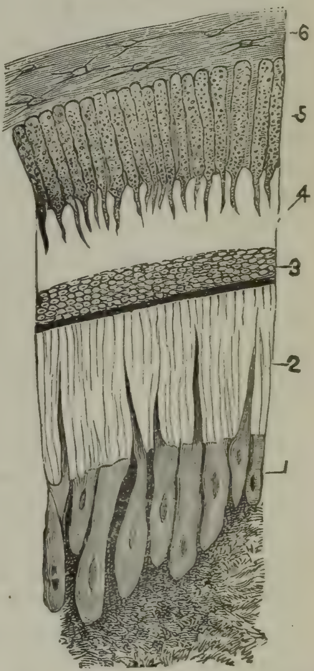


Fig. 11. Section of forming enamel and dentine. Pig, 10 c. Zeis, obj. 1-15. 1. Odontoblasts. 2. Dentine. 3. Thin layer of enamel showing pits. 4. Space caused by shrinkage. 5. Ameoblasts, with Tomes's processes, extending into space 4. 6. Stratum intermedium.

In the calcification of dentine, as we have seen, the odontoblasts do not become directly calcified, but send out rod-shaped fibrils, around which tubular dentine is formed; so also in the enamel we have the prismatic ameloblasts superintending the deposit of prismatic enamel.

If a newly-formed layer of enamel which lies on the dentine in a thin plate be torn off from a thick section of tooth and mounted, the outer surface will be seen to be pitted,—that is, provided you have succeeded in getting the enamel in just the right stage of calcification. The periphery of the pits corresponds to that of the ameloblasts. The ameloblasts during the formation of enamel seem to be impregnated with lime-salts, and break with a clean fracture at almost any point,—sometimes near the newly-formed enamel, and sometimes at a point just inside the nucleus.

C. S. Tomes noticed the fact of the probable impregnation at the end nearest the forming enamel, and cited it as proof of the actual conversion of the ameloblasts into enamel-prisms. The impregnation of both ends of the cells is accounted for in the fact that they are carrying lime-salts from the enamel organ to the forming enamel. The pits in the newly-formed enamel are the central portion of the prisms, from which the still uncalcified exudate has been drawn by the ameloblasts when they were separated from it.

This semi-calcified material, which adheres to the ameloblasts, gives the appearance of a fibril or prolongation of the cells themselves. These fibrils, which have been called Tomes's processes, I consider as thus being mechanically made, for they do not always appear, but depend upon a certain condition of the calcific material. They do not occur persistently, as do the fibrillæ of the odontoblasts. I have succeeded in demonstrating them in sections of pigs' teeth, under favorable circumstances, where they showed very plainly indeed, being nearly or quite as long as the ameloblasts themselves, and several times longer than the enamel was thick. However, as a rule, the ameloblasts separate from the forming enamel so as to leave a comparatively smooth line or plate,—that is, provided the sections have been sufficiently thin, so as not to show a ragged edge from the overlapping of the cells themselves. I have never been able to demonstrate processes that would lead me to infer the least analogy between them and the fibrillæ of the odontoblasts. That the enamel organ exists in the commencement of the development of the teeth is now generally admitted. There are certain classes of teeth, however, that do not possess enamel, and in which, although there is an enamel organ developed, the stellate reticulum fails to appear. In all cases where there is to be a deposit of enamel we find a stratum intermedium fully developed, and my observation leads me to believe that the calcification of the enamel matrix is largely due to a calcific material stored in the meshes of the stellate cells of the stratum intermedium. If an osmic acid solution be injected underneath the mucous membrane of the mouth of a perfectly fresh eight or ten-centimenter fetal pig, and it then be immersed in a solution of equal parts of the same solution and alcohol to harden, the morphological changes in the cells of the enamel organ will be arrested. If we lift the mucous membrane from its bed after the tissue is sufficiently hardened, the enamel organs will adhere and bring up with them their papillæ. You thus isolate the enamel organ from all surrounding calcified tissue; imbed and make sections, and these sections will show that what appears to be the reticulum of the stellate cells is in reality a broad mesh, the reticular appearance, with large interspace between, resulting from the shrinkage of the cells in the process of hardening with Müller's fluid, chromic acid, etc.,—these latter failing to arrest the morphological changes. In the meshes of the stellate cells prepared by the osmic-acid method, which has stained the cells a very dark brown, are seen numerous minute granular bodies, which have a high refractive power. If a few drops of dilute nitric acid be put on the slide near the edge of the cover-glass and allowed to run under, these granular bodies will disappear, and at the same time large numbers of bubbles accumulate and force themselves out from under the cover-glass. In this experiment we have a positive demonstration of the presence of carbonate of lime in the meshes of the stellate cells of the fully-developed enamel-organ previous to the beginning of the process of calcification of the enamel. These granules of lime do not appear in sufficient quantity to result in completely calcified tissue, but are held in a state of suspension; but, as the meshes of the stellate reticulum shrink, the granules of lime are brought nearer together, and by approximation stiffen the tissue. The presence of a non-shrinkable material in the meshes of the stellate cells of the stratum intermedium accounts for the different results, as regards shrinkage, in the processes consequent upon preparation of tissues.

Previous to the beginning of development of the enamel we find little or no shrinkage of the enamel organ during the hardening and decalcifying processes, provided the hardening is accomplished first. It is only after the stellate cells have given up a portion of their lime-salts, either by forming enamel or by being decalcified before hardening, that any considerable shrinkage occurs. The shrinkage in the first instance is localized in that portion nearest the forming enamel; in the latter it is general. The shrinkage on the part of the enamel organ, in any case, is more apparent than real; the space formed by the separation of the enamel from the ameloblasts being largely due to the greater shrinkage of the dental pulp, which draws the formed dentine and enamel down from the sides of the cone-shaped enamel organ. If the stratum intermedium is, as has been stated, very rich in albumen, and does not contain calcific material in large quantities, there would be a very great shrinkage in preparation, due to the rapid taking up of its water by the acids used in decalcifying, which is not the case previous to the commencement of the formation of the enamel. But after calcification has begun, and the stratum intermedium has given up a portion of its lime-salts, then more or less shrinkage is noticed; or if decalcification is accomplished by hydrochloric acid, which has no hardening property, and the tissue is afterwards hardened in alcohol, we notice the same phenomenon, which is due to the same cause, viz., the giving up of its lime-salts previous to the coagulation of the albumen in the substance of the tissue. Thus, I see in the stratum intermedium an essential agent in the process of the formation of the enamel, and not a mere occupier of the space to be taken by the formed enamel, as some would have us believe.

The stratum intermedium is the storehouse, so to speak, of the calcific material from which the first-formed enamel is derived; the width of the space so occupied bearing, as a rule, a proportionate thickness to that of the enamel. This is best illustrated by the development of the molars, where it is plainly shown. That there is a very great difference in form between the enamel organs of the centrals, cuspids, and molars, in the same mouth, and also that this difference exists among the several classes of teeth, none will dispute. I hold that the enamel organ is the matrix former,—as the fetal femur is to the mature femur so is the enamel organ to the fully-developed tooth. They are the matrices that govern the form of the fully-developed tissue, at least in a general way,—in each can be seen the type of the resulting product. The concave face of the enamel organ gives form to the future tooth in the Carnivora; the dentine forming against the inner ends of the ameloblasts. Sometimes the fibrils of the odontoblasts penetrate between the ameloblasts, and we have as a result an interlacing of the dentinal tubuli and the enamel prisms. This interlacing of the fibrils of the odontoblasts with the ameloblasts militates against the theory of a limiting membrane existing between them. That this occurs before the process of calcification begins I have no doubt, although I have not been able to demonstrate it. The forcing of the soft fibrils of the odontoblasts between the calcified enamel prisms is impossible. I have a pathological section from a human incisor, taken from the superior maxilla of a man who, when he was four years of age, was kicked in the mouth by a horse and seriously injured. When his permanent incisors erupted they each had a furrow on their labial and lingual faces, showing faulty development; into these furrows horns of dentine projected fully one-half the thickness of the enamel. The fissure in the enamel resulted from a displacement of the ameloblasts at the time of the accident. Into the fissure thus formed the fibrils of the odontoblasts projected, thus showing the tendency of the odontoblasts to send out their fibrils until they meet an obstruction. In normal development this obstruction is formed by the inner layer of the enamel organ.

The ameloblasts, after superintending the deposit of the enamel, become shortened and widened. This transformation gradually continues until they are changed into a perfectly homogeneous membrane, which latter becomes hornified and forms the cuticula dentis or Nasmyth's membrane. After the disappearance of the enamel organ as such, the ameloblasts come in contact with the rich plexus of capillary vessels that surrounded the enamel organ. The enamel organ cannot be a secreting organ, except in so far as it furnishes the lime-salts for the calcification of the first-formed layer of enamel. Neither can it furnish "the pabulum for the building up of the ameloblasts in the direction of their length," except in the very first stage of calcification. As regards the development of the dentine of the root of the tooth, it is formed as the dentine of the crown by a secretion from the odontoblasts, calcified around the dentinal fibrils;

also a prolongation of the odontoblasts. Calcification, beginning at a point farthest from the pulp, progresses inward. At first the apical foramen is large, bounded by the thin layer of dentine, but as the dentine increases in thickness the foramen gradually narrows, until it presents the appearance seen in the fully-formed tooth, viz., a constriction of the pulp-canal.

The dentine and cement of the root are formed between the body of the odontoblasts and the connective-tissue envelope which surrounds the developing tooth. This envelope is lengthened with the pulp in the process of elongation of that organ previous to the formation of the root. If we examine the connective-tissue envelope, we will find it richly supplied with blood-vessels, which form a complete network of capillaries. It is supposed that the white corpuscles escape through the walls of the capillary vessels and become changed into osteoblasts, which in some manner superintend the formation of cement. The development of cement is analogous to subperiosteal formation of bone in long bones, and is, consequently, subpericemental. In the Herbivora cement is deposited over the entire tooth; in the Carnivora the tooth erupts through the upper portion of the sack before the process of cement formation begins, and cement is deposited on the dentine of the root; in the Rodentia, however, we find cement deposited on the lingual face of the tooth and enamel on the labial. Secondary dentine is calcified in the same manner as primary dentine. Exostosis of the roots of teeth is the analogue in structure of the first-formed cement. If the source of nutrition had not been cut off from the enamel organ by the eruption of the tooth, I have no doubt that caries of enamel would have been repaired in a manner similar to caries of bone. In conclusion, enamel, cement, and dentine are secreted by special organs, which persist after the formation of the different parts of the tooth, odontoblasts as odontoblasts, cement organ as pericementum, and enamel organ, modified by change in surroundings, as Nasmyth's membrane.

HERBST'S METHOD OF FILLING.

DEMONSTRATED BY DR. G. C. CLUDIUS, GRENOBLE, FRANCE.

[Translated from the "Revue Odontologique," for the DENTAL COSMOS.]

AT the July meeting of the Odontological Society of France, Dr. Cludius, from Grenoble, made the following demonstration of a new method of gold filling, saying:

We feel the necessity of making the operation of filling teeth with gold easier, if possible, especially in difficult cases, in order to lessen the fatigue of the operator, as well as to prevent the suffering of the patient, during hours without interruption, under the ceaseless blows of the mallet. The remedy has been sought in new forms of material, like sponge and crystal gold. These have not given any help in the performance of good operations, but have rather facilitated poor work. We are not in need of varieties in the forms of gold, but we ought to try and improve its manipulation, and this has recently been done in a novel manner by Dr. Herbst, whose rotation method has been mentioned in the dental journals within only a few months; and yet it seemed necessary that this great invention, made in Bremen, should take its way by America to come to us.

In the January meeting of the Odontological Society of New York, Dr. Bödecker mentioned it for the first time, describing the excellence of fillings made by Dr. Herbst in less than half the time that any mallet work would have required, and he expressed his intention of going to study the method with the inventor. Thinking that I was yet nearer to Bremen, I went thither, and found there Dr. W. D. Miller, who had come on the same errand. Mr. Brasseur had also written to Dr. Herbst, and it is by his (Mr. B.'s) invitation that I came to Paris to show you what I have learned in Bremen. To-morrow morning I shall show the method in the mouths of patients at the Dental College of France. Dr. Herbst did not patent his new method, to which may be given the name of "rotation gold filling." All he desires is that every one may try the system, and he feels himself already largely paid by the acknowledgments he is daily receiving.

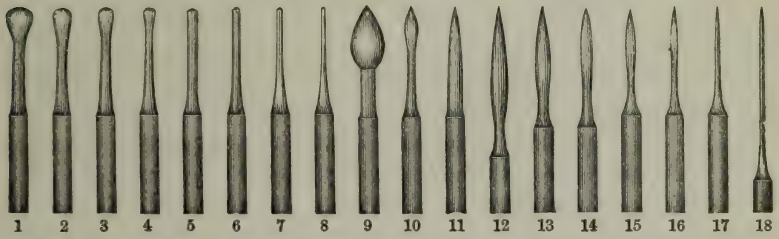
He proves that by his way of rotation one is able to adapt the gold more perfectly to the walls of the cavity than by any other means hitherto employed. One can thus work gold in the very weakest teeth, because there is no force employed, yet the gold is as much condensed as by any mallet known.

The new instruments are very simple, and you may find them in the dental depots. One can easily prepare them for himself—at least the principal one, No. 5—by putting a broken burr in the handpiece and holding it like a pen for writing until the rotating end of the burr is ground to a roof-like shape, on a dry Arkansas stone. Nos. 1, 2, 3, and 4 are smooth burnishers, and help to fix the first layers of gold in large fillings. They are afterwards used as finishers. Nos. 9 to 17 are finishing burnishers, and No. 18 is a needle-point finisher.

The cavity is to be prepared in the usual way, but retaining-points are very much less needed than for other methods. Take, for instance, a central cavity in a molar,—and, moreover, the fundamental idea of this system is to transform all cavities to be filled into central cavities. Now fix several cylinders, of a size proportioned to the cavity, with a common plugger, and then take No. 2, or 3, or 4, and by a slow rotation polish the gold against the walls. If the gold does not stick directly, put in more cylinders with the plugger, and re-commence the condensation with the burnisher. On this first layer of gold a second one is to be made to adhere; but the polished surface prevents, and here No. 5 finds employment in quick rotation and interrupted touches, until the polish is gone. (I may here remark that the gold is condensed by this rotation and without pressure in a very remarkable way.) For large fillings, No. 5 is to have proportionate points,* which, if too fine, will make holes in the gold, and the pressure is to be intermittent, in order to avoid the development of heat, which would be painful and irritating to the pulp.

All the instruments by use get gilded, and will not work longer without tearing out the gold; but this inconvenience may be prevented by occasionally rubbing them while in rotation upon a piece of tin.

The filling of the cavity is continued in the way above described.



Let us now take the case of two incisors with lateral cavities approximating one another. The two cavities, prepared as usual, are treated as if one, and the gold is at the same time introduced into both cavities, fixing some cylinders in the four corners by rotation of the proper burnishers, and condensation with No. 5, until they are filled, so that there appears to be a single mass of gold. No. 18 is then pushed with regular rotation between the teeth until the mass is quite separated, so that thin files, and disks, and tapes may be employed in finishing the fillings.

In filling similar cavities between the second bicuspid and first molar, after they are properly prepared, place a matrix and fill one cavity with shellac to retain the matrix and distribute the resistance, and then fill the other like a central cavity, beginning at the cervical border, and, pressing especially against the matrix at that point, work towards and finish at the middle of the crown. Having filled the first one, remove the shellac and fill the other in the same way.

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* In the cuts, Nos. 6, 7, and 8 are proportionate modifications of No. 5.

The rotation and the pressure, *if intermittent*, do not produce heat, —at least, not more than will render the gold cohesive.

Dr. Herbst filled for me two molars, carious to the cervical border, and very sensitive there, for which reason they had for years been filled with plastics, because I was afraid of perforation if retaining-points were made, without which gold filling by malleting would not have been possible; and I was too nervous to sit three or four hours in the chair. Dr. Herbst filled both teeth by rotation, without retaining-points, in a little more than one hour. Several gentlemen present have seen them and observed the severe tests to which Mr. Brasseur subjected them, and I may add that notwithstanding the great sensitiveness of the dentine and the proximity of the pulps, I felt not the least inconvenience from heat, and my own patients bear like testimony.

We will now split a crown filled in the hand, and you see that the gold is pressed into the smallest depressions of the interior surface, and is so uniformly condensed as to resemble an ingot, impossible to separate in pieces, yet you may note the different stages of the rotation.

I saw Dr. Herbst fill six cavities—some of them large ones—in front teeth, taking altogether, at the same sitting, about one hour.

It would be difficult to precisely describe the manipulation requisite for the great variety of cases presenting in practice, but I have explained to you in theory the typical ones in the hope of stimulating you to try this method of filling by rotation, which I look upon as one of the most ingenious modes yet given to our profession. The results are splendid, and the operator will thereby save much time and prevent great suffering on the part of the patient.

REGULATING AND MASKING DENTAL IRREGULARITIES.

BY JOHN H. MEYER, D.D.S., NEW YORK, N. Y.

A NOTABLE case was that of a Miss ——, aged nine years. The superior incisors shut down nearly to the gums behind the inferior incisors and cuspids, the cusps of the erupting superior cuspids being barely visible. I made a vulcanite plate covering the palatine surface, and anchored in the plate the ends of a gold wire, which, bearing against the distal surfaces of the laterals, passed in front of both them and the centrals. Rubber ligatures connecting each tooth with the wire were the moving means employed. The appliance was inserted on the second day of March, and in eighteen days the superior incisors were in normal relations with the inferior.

The next case was that of a young lady eighteen years of age, and a cousin of the Miss previously referred to. The cut (Fig. 1) is an illustration of the case on presentation; and Fig. 2 shows the regulating appliance, which is like that employed in the first instance; rubber ligatures being also used. The cut (Fig. 3) shows the result after twenty days from the date of the insertion of the appliance (Fig. 2). It is a noteworthy fact that five other members of that family present protrusions and irregularities similar to the two that I have described. My success in these cases was due to the valuable advice and suggestions of Dr. K. C. Gibson.

FIG. 1.

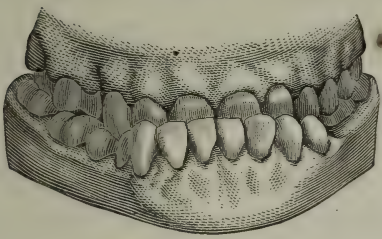


FIG. 3.

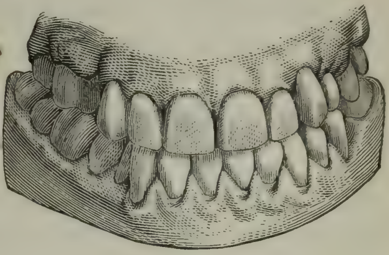


FIG. 2.

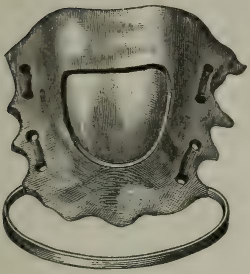


FIG. 5.

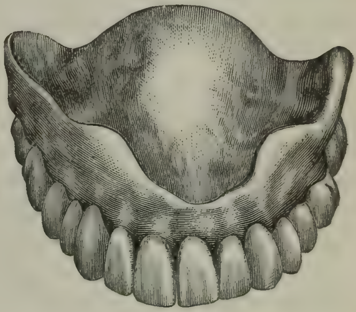


FIG. 4.

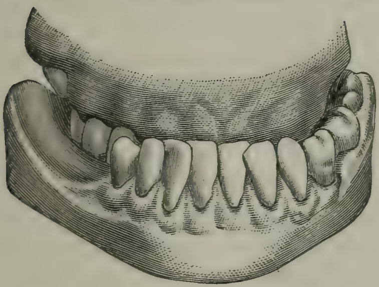
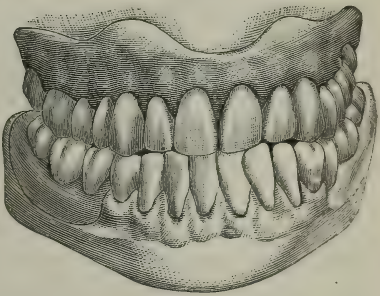


FIG. 6.



A third case was that of a lady of about thirty-five or forty years, who presented the very peculiar condition shown in Fig. 4, by which it may be seen that by occlusion the superior teeth and even the gums immediately above them are quite hidden in front view by the inferior teeth, which project about three-eighths of an inch in advance of the necks of the superior centrals. All of the superior left bicuspids and molars had been lost, as had also the inferior right bicuspids and molars, and the second bicuspid and first molar of the left side. The age of the subject, the great distance to be traveled, and the nearly horizontal positions which the teeth would assume if moved, all precluded the former methods of procedure or usual devices for the correction of the malposition; and the removal of those teeth was out of the question. I concluded to make a dental mask, which, together with a partial inferior denture, would meet all the indications in the case. I obtained a good impression and plaster cast, from which I got a mold composed of plaster, fire clay, sand, and asbestos (each one part), and into this mold, when thoroughly dried, I poured melted zinc, thus securing a perfect model, over which I swaged a thin platinum plate to cover the internal and external surfaces of the teeth, including the external surfaces of the gums as far as the muscles and frænum would permit, intending to make the rest of the plate of Reese's metal. The swaged plate was placed on the plaster cast, which it fitted well, and, with a gutta-percha trial-plate covering the palatine arch, the proper articulation was obtained.

I had made from my designs the necessary teeth, which were peculiar in being of half the usual thickness, with the pins set near the cutting edges. The pins rested on and were soldered to the ridge of the platinum plate, where it covered the cutting edges of the natural incisors; and, as a precaution against contraction, I soldered a platinum wire on the plate from condyle to condyle, so to speak, and, after the teeth were mounted in continuous-gum, I cut off the wire. A gutta-percha plate was again attached and waxed as for vulcanite, and the mask then sent to Dr. Reese for casting. His metal, however, contracted sufficiently to check the continuous-gum, and make the mask worthless, thus leaving me where I began.

Still confident of ultimate success, I took another impression in plaster, had another set of teeth made, and proceeded as before, with the exception of making the platinum plate to cover a narrow portion of the palatine surface adjacent to the natural teeth. I then completed it with black vulcanite, and the case came out of the vulcanizer all right. I placed it carefully in a drawer to be subsequently finished, but found the next day that by contraction the gum was checked as before, and to my great dismay I had another failure on my hands. Thinking, however, that the red rubber might not contract so much as the black, I determined to try once more, and again took the impression in plaster; removed the vulcanite from the plate; repaired it; cut away the platinum from the palatine surfaces; went through the same process as before, using red rubber, and with a like result; but I finished the mask, as I then felt quite satisfied that the checking could not be avoided, and therefore made up my mind that the mask in this condition was the best that I could obtain. I found upon trial that, although there was some adhesion, it was not enough to keep the structure in place, and therefore some auxiliary means must be devised. It was my intention to employ spiral springs, but I took the mask to Philadelphia and showed it to Professor Litch, who suggested the use of white gutta-percha. It was necessary to cut a retaining-groove in the vulcanite along the line corresponding to the palatine junction of the natural teeth with the gums, and after placing some softened white gutta-percha in that groove, the structure was pressed into place and held there until the gutta-percha became hard. The mask was then found to remain firmly in place. Fig. 5 shows the finished mask. A vulcanite plate supplying the place of the absent inferior bicuspids and molars completed the operation with the results seen in Fig. 6.

The transformation thus wrought in the appearance of the patient may be imagined, after a careful comparison of Fig. 4 with Fig. 6, but to fully appreciate the change one should first see the chin nearly meeting the nose, the sunken upper lip, especially in the region of the cuspids, and the generally repulsive aspect given to the countenance by so great a projection of the lower jaw. Now, not only is the appearance made pleasing, but useful, health-giving masticating substitutes are supplied. It is believed, moreover, that this construction of a dental mask is unique in the history of dental prosthesis; but there may be such a fact of which I am unaware.

TRIPLEX-ACTING DEVICE FOR REGULATING TEETH.

BY J. N. FARRAR, M.D., D.D.S., NEW YORK CITY.

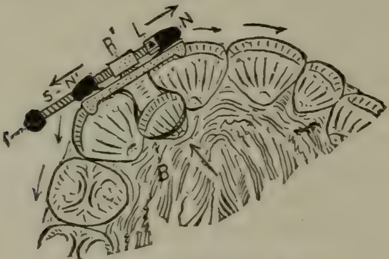
No. XXII.

There is a form of irregularity in which teeth erupt in the posterior position, because of insufficient room between the adjacent teeth. To force these teeth apart has hitherto been considered a preliminary step to that of forcing the outstanding tooth into position. To render this class of operations easier, I have contrived a device which I term a triplex-acting screw-loop, because it forces in three different directions at the same time by turning one screw.

One form of this device, made entirely of gold or platinum, is so clearly illustrated by Fig. 135 that it requires but little further explanation.

Parts.—A screw, S, with a non-irritating thimble, T, on the terminal end, the opposite end being set in a smooth-bored socket-nut, N, is made to rotate by means of a lever-key, used in the holes, L, so that when the threaded nut, N′, moves along the screw, S, toward the thimble, T, it will cause the ribbon-like loop, B, to straighten, and thus it will not only draw upon the outstanding lateral incisor in the direction indicated by the arrow, but force oppositely outward at the same time the cuspid and central in the direction also shown by arrows.

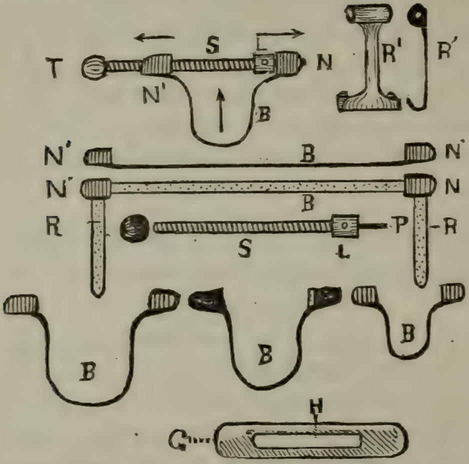
Fig. 135.



Triplex-acting Screw-loop.

Fig. 136 illustrates independently the several parts of the machine. Similar letters indicate corresponding parts, shown in the

Fig. 136.



Different Views of the Triplex-acting Screw-loop.

different views. B, band; S, screw; N, N′, nut; R, retainer; P, pivot; G, collar-plate; H, hole; T, thimble, to prevent irritation of the mouth.

In order to prevent the device from impinging upon the gum, it is sometimes necessary to make use of gum-guard rings, such as those illustrated in Fig. 100, DENTAL COSMOS; ear-like appendages, R′ R′ (Fig. 136), fastened to the screw, S, so as to extend over the cutting edges of the teeth, as shown in Fig. 135, or strips of plate, R R, soldered to the nuts, N′ N′, as shown straight in Fig. 136; but as a rule none of these are necessary. Should the side teeth be sufficiently far apart, and it be desirable to hold them in a fixed position while the outstanding tooth is being drawn into line, a collar plate, G, with a hole, H, for the loop, B, to play in may be used; but in most cases this is superfluous. Of all the devices that I ever contrived for regulating teeth (upwards of 200), I am the most pleased with this.

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PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION—TWENTY-FOURTH ANNUAL SESSION.

(Concluded from page 610.)

THIRD DAY—*Morning Session* (*continued*).

Section I. was called, and the report was read by Dr. W. H. Trueman, chairman, of which the following synopsis is presented:

Noting the very slight advance or even change in the department of mechanical or prosthetic dentistry, and the little attention it is receiving except in those branches which approach near to or interlock with operative dentistry, the report doubted whether the disposition to draw the line sharply between the mechanic of the laboratory and the mechanic of the operating-room is commendable. The journals of the past year present little that is new or really of interest, except in connection with pivot-teeth and bridge-work. But in this direction so many new ideas have been presented and so many old ideas have been revived and modified that the Section suggests as subjects worthy of attention, the preservation of roots, either as supports for artificial crowns, or to preserve the natural contour of the mouth, and the repair of badly injured teeth by other methods than filling. In this connection a method for obtaining the model of a root suggested by Dr. John G. Harper in the *Archives of Dentistry* is described. He takes a piece of annealed steel wire, No. 27, passes it around the root at the point where the band or ferrule is intended to embrace it, and bringing the ends together twists them until the wire is drawn tight and fits the root "snug;" he then removes the wire ring, and, laying it on the previously smoothed end of a block of close-grained wood, with one blow of a flat-faced hammer drives it into the wood, forming an exact model of the circumference of the root, with which a band or collar is readily fitted. A cap for the ferrule is easily made by laying a suitable piece of gold or other metal on the block, and, placing the steel wire ring over this, with a sharp blow of the hammer cutting out the plate the exact size and shape ready to solder into the band. Speaking of the use of "Spence's metal" and the screw-press for making dies, the report doubted the value of this compound as a substitute for metallic dies, though it might be useful for models on which to adjust pivot-teeth and bridge-work. A method of making vulcanite described by Mr. George Burton in the *British Journal of Dental Science*, for which the inventor claims greater cleanliness, a saving of time, and a better and stronger plate than when made in the usual manner, is as follows: He packs his case—in a way not clearly explained, but—without a flask; then covers the rubber with tin foil, and, placing the case in an iron box, packs steatite around it until the box is full. It is then placed in the vulcanizer and vulcanized. The report then discussed the ethics of supplying expensive appliances, as continuous-gum work and some forms of bridge-work, which cannot be repaired in case of need except at great cost to the patient. It also referred to the tabulation of the temperaments with reference to "expressional" substitution published in the Dental Cosmos for February, 1884. These tables, while merely suggestive, are considered worthy of study. It is well to keep in mind in this connection that the changes in the mouth following extraction are so great that we could not by any possibility restore the teeth extracted to their former positions and produce the same expression. In some respects we may follow nature too closely In practice we are compelled to compromise some points: as illustration the smaller arch of the edentulous jaw was mentioned, necessitating a smaller tooth and less masticating surface, and the changes in articulation necessary for stability.

In the department of chemistry Dr. W. B. Ames, of Chicago, submits a method of bleaching pulpless teeth by the decomposition of a solution of sodium chloride in the cavity by means of a galvanic current and fine-pointed platinum electrodes, and a method of disinfecting putrid pulps by the decomposition of water acidulated with sulphuric acid—one minim to the ounce—within the putrid mass. A galvanic current is passed from a finely pointed platinum annode placed in the canal containing the acid solution to a sponge-covered cathode placed upon the mucous membrane adjacent. Dr. Ames claims that the electrolytic decomposition of compound bodies is much simpler than the chemical process, especially when the decomposition is to be accomplished within the oral cavity.

The Section also reported two papers, respectively by Dr. John Allen, of New York, and Dr. J. A. Robinson, of Jackson, Mich.

Dr. John Allen read his paper, of which the following is an abstract:

Dr. Allen's paper was a plea for more thorough work and a higher standard of attainments in prosthetic dentistry. To this end the varied requirements of different individuals and the functions of the natural teeth with reference to mastication, enunciation, articulation, and expression must be carefully considered. A properly constructed artificial denture is an expression of the highest art, in that its artificial character is concealed. The skillful dentist carefully avoids mechanical sameness, because his artistic perception enables him to discriminate the differences by which each case is individualized, so that the length, size, form, position, and adaptation of the teeth, the lighter or darker shades and tone of the teeth and gums are in harmony with the age, complexion, and expression of the person for whom they are intended. In order to attain the front rank in his profession the prosthetic dentist must possess a knowledge of the elements of chemistry, with reference to the hygienic properties of the materials he uses; he must know the nature of the various metals and minerals employed and the art of manipulating them; he must have a knowledge of anatomy, physiology, therapeutics, and the principles and practice of dental surgery; he must besides possess mechanical skill and artistic talent. It is evident that many who construct artificial dentures are deficient in some or all of these qualifications, and such men will of necessity occupy subordinate positions. The remedy is obvious. All the various modes of making artificial dentures seem to have their proper place, and it is the duty of the dentist to decide which method will secure to the patient the greatest degree of practical utility and personal gratification, and advise accordingly. In respect to concealing the artificiality of artificial dentures the continuous-gum system afforded the best results, in the writer's opinion.

Dr. J. A. Robinson's paper was not confined to the subjects included under Section I., but was a discussion of various points connected with the practice of dentistry.

The natural teeth are neither oblong nor round; the molars are octagonal, with the posterior buccal surface falling away and shortened towards the back part of the mouth; the bicuspids are wedge-shaped; and the incisors a little more round, but still retaining the wedge shape toward the palatine surface of the mouth. In an artificial denture the teeth to present a natural appearance must approximate these shapes. Without scientific principles underlying its construction, a set of teeth never satisfies the uses it was intended to serve. The good dentist possesses the qualities of the artist and of the mechanic combined. One of the essential things for him to know is how to make his own instruments, in order that he may repair them and keep them in order, for without perfect instruments perfect work is impossible. True art must appear natural and living, and be according to the laws of the living. All living things are according to mechanical and geometrical laws, and nature is perfect art. The artist-dentist is learned though he may never have been schooled; he has graduated though he may never hold a diploma. The writer thought that there were some among the older members of the profession who entered its ranks before the facilities were what they are now, and to whom circumstances precluded the possibility of a graduating course, but who have so lifted the profession by their genius as to have earned some recognition from their fellows. As in other walks of life the title of LL.D. is conferred upon those whose labors have helped the world, so might the distinction of a title be properly conferred upon these. A man is not a dentist unless he is master of his whole calling,—of all that relates to the cure of diseases of the mouth. The care of the teeth seems to be fundamental. When parents can be impressed with the fact that the teeth are essential to the health and well-being of the child, extraction will no longer be necessary. If taken in season, when the decay is readily polished off with the aluminium disk and corundum powder by the "Arthur" system, it seldom becomes necessary to fill children's teeth on the approximal surfaces. This method is particularly applicable to the posterior molars of the first dentition and to the anterior surfaces of the first molars of the permanent set, and, the writer said, he had practiced it with great satisfaction for many years in treating the inferior and superior bicuspids. The most desirable attainment to be reached is the painless operation. The most effective agent for this purpose that the essayist has found is composed of equal parts by weight of caustic potash and carbolic acid braided together into a crystalline paste, and applied to the cavity before the cutting is commenced and then again after the loose decay has been removed. If desired to be less pungent the quantity of caustic potash may be reduced, or it may be wiped out with carbolic acid. The pain, which is slight at first, soon passes away, and then the cutting is painless. The writer regards tin as the best preservative material for filling teeth, because when the chlorine contained in the buccal fluids or manufactured from the salt contained in the food comes into contact with the tin, it is set free, and, uniting with the tin, forms chloride of tin, which is antiseptic. Perhaps, also, the nutritive fluid, containing chlorides, which passes through the tubuli of the dentine, acts upon the inner surface of the tin in the same manner as the fluids of the mouth act upon the external surface, thus making the whole filling antiseptic.

We may be certain that amalgam fillings fail whenever the cavity runs beyond the free margins of the gums. Amalgam is neither antiseptic nor escharotic, and its shrinkage forms a subterranean crypt between the walls and the filling which becomes a nursery for bacteria. Tin has less elasticity than the other metals, but when combined with platinum and gold it becomes more ductile and harder when burnished or malleted, and capable of resisting attrition even when attenuated near the borders of the cavity.

The Section was passed, and Section II. was called. Dr. C. N. Peirce, of Philadelphia, chairman, read the report, of which the following is a summary:

The report of Section II. noted the general desire on the part of the dental schools that the curriculum and standard of graduation should represent the highest degree attainable; never before was there a time when the representatives of ten of the schools could have formed an association and adopted resolutions with such unanimity which abrogated customs which had been in vogue for thirty years. Such an association was organized at a meeting called for the purpose of establishing, if possible, a uniform standard of graduation. The result of its labors was the adoption of a number of resolutions,* which were read. The increased efforts to procure legislation for the regulation of dentistry, which have resulted in the passage of laws and the creation of examining boards by many States for the protection of the public against charlatanism, were also instanced as evidence of progress. Although these facts indicate the progress that has been made in the cause of dental education, we are not to cease from effort to achieve still further advances. What has been done but widens our field and increases our responsibilities. This day is demanding from those entering upon the study of dentistry a broader intellectual development, a sounder, more substantial knowledge, a keener, more critical judgment for the study of cause and effect as revealed in the histology, physiology, and pathology of our specialty; a more conscientious personal responsibility, a more wholesome moral standard, and, last but not least, a clearer appreciation of the worth and wealth of our calling. Of the students graduated each year, ten per cent. will have dropped out of the ranks within two years, and of the remainder not more than five per cent. will be recognized at the end of five years as actively interested in the scientific aspect of their profession. These results are due, in the estimation of Section II., to the fact that every year men enter the classes who are deficient in one or another of the essentials—lack of education, or lack of mechanical ability, etc.; hence failure when they begin practice. To remove these causes of failure some means must be adopted whereby the fitness of those about entering upon study may be known. This association has frequently discussed the propriety of the dental schools establishing preliminary examinations and requiring of students attendance upon two full courses of lectures before admitting them to examination for the degree. If the suggestions and restrictions embodied in the resolutions previously adopted can be carried out in the spirit and intent in which they have now been accepted, they will certainly prove important factors in the cause of progressive education. In the hope that the way may be opened for the realization of a nearer approach to an ideal association, the Section offered the following queries: Can this body do nothing more than is being done to enhance the status of its own members? Is individual research recognized and appreciated to the extent of its worth and influence? Are we offering every possible incentive to original research and careful observation?

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*See report National Association of Dental Faculties, DENTAL COSMOS, September, 1884, page 560.

The following resolutions were appended to the report:

Resolved, That the American Dental Association deems it incumbent upon all well regulated dental educational institutions to require from candidates for graduation, that they shall have attended two full courses of lectures in reputable dental institutions before being admitted to examination for the degree of Doctor of Dental Surgery.

Resolved, That the American Dental Association deems it incumbent upon the faculties of all reputable dental schools, to require from candidates before admitting them to graduation not only attendance upon the requisite lectures, but a degree of proficiency in the final examination which shall give evidence of professional worth both in the principles and practice of dentistry.

Dr. C. W. Spalding, St. Louis, said that the action of the association of dental faculties, as outlined in the report, had his most cordial approval in the main. The only objection that he could find was the provision that permitted a man holding a medical degree to graduate in dentistry after spending only one year in special study and practice. His experience is that such a man, without other qualification than the medical degree, is not as competent to practice dentistry as a good chemist or a skilled mechanic. He wanted to put this objection strongly. We have catered too much to the medical degree. All that we should demand is that a dentist shall be well qualified before being permitted to begin practice.

Dr. R. Finley Hunt, Washington, D. C., also commended the action of the National Association of Dental Faculties. He thought that the steps that have been taken to insure harmony between the colleges in the matter of graduation justified the expectation that the best results would inure to the cause of education.

Dr. G. J. Friedrichs, New Orleans, disagreed with Dr. Spalding as to the propriety of granting to medical men the right to come forward for graduation in dentistry after one year of special training, because he felt that the medical man already had the right to practice dentistry without any further study. He therefore thought the action of the association of faculties wise. He knew very well that the M.D. who attempts to practice dentistry without special training scores a failure.

Dr. W. W. Allport, Chicago, wished to thank the Section for its report, and especially he wished to thank the association of college faculties for their action on one particular point—with reference to the graduation of medical men. It is well known that the speaker has long favored the idea that dentists should be specialists in medicine; that the foundation for the treatment of any disease should be laid in a medical education—not simply the degree, but a real medical education. He does not believe that dentistry is a profession, only in so far as it is medical; outside of that it is a mechanical art. He wished to thank the college faculties for having recognized medicine as having something to do with the practice of dentistry. It is a step in the right direction.

Dr. Spalding thought that acquiring a preliminary medical education was putting the cart before the horse. His idea is that you should lay the foundation for the practice of dentistry the first thing; then, if you want to adorn yourself with a medical education, well and good. A dental education includes a knowledge of the principles of anatomy, physiology, pathology, therapeutics, materia medica, and chemistry, and a thorough knowledge of what is called operative and mechanical dentistry. Why should we require a thorough education in the branches which are not essential?

Dr. C. D. Cook, Brooklyn, would ask Dr. Spalding what is the foundation of medicine?

Dr. Spalding. Dentistry and medicine have certain things in common.

Dr. Cook would like to know where the difference begins.

Dr. Allport. If a preliminary education is necessary to successful practice, what can be more essential to the dentist than a medical education? One gentleman has spoken slightingly of medical attainments for the dentist as merely ornamental. We don't want the medical degree as an ornament; what we need is a real medical education, and of that we want all we can get. We have not a textbook in use in our colleges that has not come from a member of the medical profession.

Dr. Frank Abbott, New York, had no doubt that the gentlemen all thought about the same. What are truly termed medical works are not generally used in dental colleges. They use scientific books, without which neither the medical nor the dental schools would make great progress. Without anatomy we would have no foundation for our practice: anatomy is not purely a medical study. Then there is physiology; it is not medical. Of pathology and chemistry the same can be said. They are not medical, strictly speaking. But when we come to gynecology and practice, we enter the domain of medicine proper. One thing is sure,—no man can get too much education. The more of it the young men acquire the better will they be prepared to enter upon their work. He felt that the steps taken by the association of faculties as detailed in the report of the Section were great advances.

Dr. M. L. Rhein, New York, thought there was no question that the books treating of anatomy, physiology, chemistry, and materia medica are scientific works, but if they are not also medical, he would like to know what are medical works. They really comprise all there is of medicine, and medical education begins and ends with these.

Dr. W. H. Atkinson, New York. In educating a man for practice mere lectures are nothing. You cannot make a man a diagnostician except by giving him the experience which comes from hospital practice. Dentistry occupies a higher plane in medicine than medicine itself, because dentists can demonstrate their work and physicians cannot. The best men in any profession are those who have worked out for themselves the problems which met them and gave the results of their work to their fellows. The men who are most deficient are those who are most exclusive. It is the lone observer, who interrogates nature, and, illuminated by truth, tells what he observes, so that it may become the property of all men, to whom progress is due. Have we received our light from medicine? Medicine is nothing but the correction of perverted activity—what they call a pathological state. What we want to do is to start anew; just as the tissues do when they are sick,—resolve themselves back into their embryonic elements and then rebuild; to do as Agassiz recommended his students to do,—throw away the text-books and interrogate nature.

The discussion was closed, and the resolutions reported by the Section were taken up and passed, with the following additional one offered by Dr. R. Finley Hunt:

Resolved, That, in reiterating these views so often before expressed, this association is gratified with the action of the National Association of Dental Faculties at its recent meeting, as being so much in accord with them.

Adjourned.

Evening Session.

Dr. Taft, chairman of the committee to which the president's address was referred, reported, recommending that the constitution be so changed that the Sections or standing committees shall consist of three members each; the chairman of each Section to be appointed for three years, and the other members for two years and one year respectively, each to be selected with reference to his fitness for the work, and nominated by the executive committee for confirmation by the association. The report also recommended that the constitution be so amended as to require the payment of the dues of members only when in attendance on the meetings of the association, the printed Transactions for each year to be sent only to members present at that meeting; to extend the period of membership of delegates to three years, delegate members during this time being eligible to all the privileges and immunities of permanent members; and to provide that any permanent member who fails to attend the annual meeting for three consecutive years shall cease to be a member.

Dr. Taft in presenting the report spoke of the difficulty of getting the committee together to properly digest the matters referred to them. The report had consequently been prepared hurriedly, and it was submitted now in crude form in order to get the views of others.

After some further discussion, the report was referred back to the committee to be perfected and printed in the Transactions.

On motion of Dr. George H. Cushing, the constitution was amended, by unanimous consent, to make the title of Section I. read "Prosthetic Dentistry" instead of "Artificial Dentistry."

Section III. was called, and Dr. Taft, chairman, read a partial report, of which the following is a synopsis:

Every material art and every important branch of human occupation has its literature, and none who desire to keep pace with the progress of the age can afford to ignore it. Letters have come to be an important agency in the development and growth of the arts, sciences, and industries everywhere, and the question with us is, to what purpose has the profession which we represent used this instrumentality, more particularly during the past two years? There is much ground for encouragement. Perhaps in no equal period during the past fifty years has so much been accomplished in this direction. Observation leads to the conclusion that much solid scientific work has been done, and permanent record made of it. Much, however, that should be recorded our literature fails to receive. Facts, principles, theories, and incidents of value never see the light through the medium of the printed page. The reasons for this are various. Some excuse themselves because of real or supposed inability to write; a few attach little importance to their own productions; some fear to run the gauntlet of criticism. In calling attention to the literary work of the profession for the two years last past, no attempt will be made to occupy all the ground nor to include all that has been done. Nor is it intended to intimate that that which is not noticed is unworthy of a place in the report. Our periodicals continue in much the same channel as heretofore, but the leading journals exercise more care, both as to matter and the manner of presenting it. The report then suggested as a question worthy of consideration, whether the profession would not be benefited by the specialization of the periodical literature. Hitherto the journals have each attempted to cover the whole field of our science, art, and education. Once it was sufficient to embrace every branch in one volume, but the expansion and more thorough cultivation of each division gave rise to the demand for volumes for each, and we now have works on Dental Anatomy, Dental Pathology, Dental Materia Medica, Therapeutics, Operative Dentistry, Oral Surgery, etc., which are recognized as the natural outcome of the progress that has been made. Perhaps our periodicals could not for a time at least be specialized as our book literature has been, but it seems practicable to do something in this direction. It would seem possible to have one or even two journals devoted to the interests of association work—Dental Societies; one or more to Professional Education; one to Oral Surgery, Operative Dentistry, Oral Deformities; one to Prosthetic Dentistry, including Metallurgy and Chemistry; one to Dental Pathology and Therapeutics. Such a division would bring together the matter pertaining to any given subject, and would make its consideration more thorough and extended; it would make each subject to stand out prominently and thus receive more attention, and would give the several periodicals an individuality they do not now possess; it would make each journal take up such particular work as would be more valuable to the profession, and would remove all occasion for objectionable competition; indeed, each would become an aid or support to every other. The better or more progressive part of the profession would feel it necessary to have a journal for each specialty or particular branch. The future of our journalism is one of the important subjects for consideration. It cannot go along upon a level; it must make progress or it will go backward. The work of specialization as here indicated must necessarily in large measure devolve upon those engaged in the work, but an expression from the profession at large, or its representatives, cannot be without influence upon those conducting our journals.

The report then chronicled the demise of the *Missouri Dental Journal*, and the inauguration of the *Archives of Dentistry*, with Dr. C. W. Spalding as its leading editor, and passed on to review some of the volumes relating to dentistry which have appeared from 1882 to 1884, including the third edition of Garretson's "Oral Surgery," the second edition of Chas. S. Tomes's "Manual of Dental Anatomy, Human and Comparative," and Gorgas's "Manual of Dental Materia Medica and Therapeutics for Practitioners and Students," which were commended as valuable aids to students and practitioners.

On motion it was ordered that the report be completed and referred to the Publication Committee. The Section was passed.

Section IV., Operative Dentistry, was called, and the report was read by the chairman, Dr. Darby.

The report stated that the Section had no papers to present, but it recommended the following subjects for the consideration of the association:

The method of packing or consolidating gold in the cavities of teeth by means of revolving smooth instruments recommended by Dr. Herbst, of Germany, who claims that the gold can be introduced and consolidated with greater rapidity than by other means, and with less pain and inconvenience to the patient. (Specimen teeth filled by this method by Dr. Herbst were submitted for the examination of those present.)

The incandescent electric lamp and its uses in dental practice.

The combination of gold with other and baser metals in filling cavities.

The danger of excessive dryness and consequent contraction of dentine and enamel where the rubber-dam and the hot-air syringe are used. The theory which has been advanced in one of the State societies is that when the tooth becomes wet again there is expansion of the tissues.

Dr. Abbott had seen the teeth referred to, as examples of the Herbst method of packing gold, and they have the appearance of having been perfectly and nicely filled. The process of filling, as he understands it, is to use an instrument having a little bulb at the end run by the dental engine, the instrument being held against the gold while being rapidly revolved, the filling being thus finished off very elegantly. As to the advisability of filling teeth in this way he was not prepared to express an opinion, although for several years he had used a tomato-shaped burnisher in much the same way for the last few pieces of gold in a filling, and the gold was very perfectly adapted.

Dr. R. Finley Hunt. Is the gold used in the Herbst method cohesive or non-cohesive?

Dr. Abbott's impression was that it was cohesive, but he was not sure of this.

Dr. G. C. Daboll, Buffalo. When Dr. Miller was here he gave an account of a visit he paid to Dr. Herbst, with whom he spent a couple of days for the purpose of investigating this method of filling. The gold used is perfectly soft or non-cohesive. Approximal cavities are filled by the aid of matrices, which when the opportunity offers are fastened in place temporarily with shellac. After the cavity is prepared, the gold is put in in large masses without retaining-points and very rapidly. As nearly as can be determined by ordinary tests, the cavity is as well filled as by any other method. The plug is moisture-proof, and tested with aniline shows very little leakage. While he was not prepared to indorse it as being all that had been claimed for it, he considered it a great novelty and worthy of investigation.

Dr. S. C. G. Watkins, Mont Clair, N. J. Dr. Timme when in Germany became much interested in the Herbst method, and procured a set of the instruments required. The gold used is what is called magnetic gold. Dr. Timme read a paper on this method and gave a clinic illustrating it before the Central Dental Association of Northern New Jersey last January. To all appearance the gold was as well condensed and put in as nicely with regard to adaptation to the walls as by any other method, and the operation was completed in a somewhat shorter time than it would have been by the ordinary methods. Last February Dr. Bödecker filled a cavity for the speaker, in which he used for packing the gold the electric mallet, the Bonwill mechanical mallet, and the hand mallet, the last part of the filling being put in with a bloodstone burnisher made by The S. S. White Dental Manufacturing Co. for Dr. C. F. Wheeler, of Albany, N. Y., who had perfected a set of instruments made of this material. The advantage claimed is that gold does not adhere to the bloodstone as it does to the steel instrument, and when finished the surface is perfectly burnished. Dr. Wheeler's idea is that if the cavity is prepared with burs, and instruments of bloodstone are used for packing, the gold can be burnished right in. In comparison with the mallet, the speaker could testify—speaking from the stand-point of the patient—that this method was perfectly lovely. He had himself tried the method advocated by Dr. Wheeler on a small scale, with agate burnishers, using No. 30 gold, well annealed, and burnishing it in. He thought anyone who tried it would be surprised to see how hard the gold can be made with but little pressure. His experience was that the agate does not seem to break the edge of the cavity when necessarily brought into contact with it, as steel is likely to do.

Dr. H. J. McKellops, St. Louis, had had a set of the Herbst instruments made when the method was first announced. It is a mistaken idea that the instruments must be highly polished; all that is needed is a smooth but unpolished surface. You cannot work well without annealing the gold. Dr. Rehwinkel, who has looked into the method somewhat, thinks there is something in it that may be of value. Jack's matrices are better, when these are required, than the one used by Dr. Herbst. Another point is that if you are not careful how you put in the gold, it rides up and down, forming hummocks, and is exceedingly hard to work.

Dr. W. C. Barrett. The gold used is an exceedingly soft preparation, known as Wollrab's gold. The speaker had experimented somewhat with the system, but had not succeeded so well with the soft golds prepared in this country; but there is this to be said, in attempting to do new things a certain deftness of manipulation is required before you can accomplish it perfectly. With proper care you can burnish the gold down until it is as perfectly homogeneous, apparently, as cohesive gold. Instruments received from Dr. Herbst are smooth, but not polished, and some of the points are exceedingly fine. They may be plated with gold. Dr. Herbst keeps a piece of block tin by his chair upon which he rubs the points every few minutes to clear off the gold which adheres to them. Dr. Barrett's personal experience with the method was not sufficiently extended to warrant him in giving a definite opinion of its merits; but that gold can be thus condensed very perfectly seems to be demonstrated. When one has acquired the deftness of manipulative ability requisite to do the work with facility, the method will probably be valuable to him. He did not know how it would work with contour fillings. The gold is used in the shape of cylinders.

Dr. A. O. Hunt, Iowa City, Iowa, had had a set of the Herbst instruments made, and had tried some experiments out of the mouth. He had met with some difficulties in getting the results claimed for this method, but he felt satisfied that these would vanish when he understood the principles on which it was founded better. One of his difficulties was that he could not hold the gold still; but that he believed was because he used too small pieces. At any rate he did not succeed until he put in quite a mass, which also wobbled about some, but as soon as it settled the filling went on all right. The surface of the filling is about like that made by fine emery cloth. He did not know of the block tin for clearing away the gold which adheres to the instruments, but observing the peculiar aptitude with which the instruments became coated, he had used the finest emery cloth he could get to clean them. He had tried many soft golds, and he could see no particular difference in their working, except that possibly the "1000 Fine" did not form "hummocks" so readily as others did. It requires a peculiar knack to succeed with this method. The principle is similar to plugging. The instrument is not held against the gold continuously, but is pressed against it and then removed in rapid alternation. He thinks the matrices are not absolutely necessary, though in a contour filling they are useful. He did not test any of the fillings under the microscope, but tried the cohesive power of the gold after it was condensed, and found that there was perfect cohesion between the pieces.

Dr. J. N. Crouse, of Chicago, asked Dr. Hunt's opinion of the effects of the rapid motion. Does it evolve heat enough to make the gold cohesive?

Dr. Hunt thought not. As before said, you do not hold the instrument continuously on the foil, but with an interrupted motion.

Dr. W. W. Allport, Chicago, thought there was just enough good in this method to make it very attractive, and just bad enough to make its adoption a great evil. No one doubts that we can secure perfect cohesion between the masses of gold; but there are other difficulties to be overcome. Just as when plastic gold was first introduced he was opposed to it and reported against it, he could now see that this method is going to be used, and unless something is done to prevent it, great injury will be done. A filling put in as is here advocated is going to be leaky; the mechanical treatment of the gold is wrong. The method may be used sometimes with advantage, but just so sure as you make it your general practice, you will be sorry for it. No doubt in finishing fillings, and perhaps in filling cavities, where there is direct açcess, there will be no trouble; but in cavities difficult of access, or around corners,—just so sure as it is used here there will be trouble.

Dr. Wm. Barker, Providence, R. I. This method is interesting because it is new, and because it announces a new principle. If you can place one sheet of non-cohesive gold on another, and with a burnisher make a perfect cohesion between them, there is a new principle. If this principle is correct there will be important advantages to flow from its application, but before we accept this as a fact we have got to see it. He could second the idea of the last speaker, that a filling put in by this plan would not be safe—it cannot be well adapted to the walls of the cavity—and he did not believe that this method would ever be of practical benefit. He used soft gold cylinders, filling in the well-known way—like placing cigars in a tumbler—finishing with a "tomato" burnisher, and he got a good surface, which might seem all right, but when it is closely examined it is not homogeneous as the surface of a cohesive filling is. The Herbst method is nothing more nor less than using the burnisher for the whole filling.

Dr. F. Y. Clark, Saratoga, had heard a paper read by Dr. Fillebrown last winter, detailing this method, and he determined to try it. He procured the instruments and the gold as nearly as he could as recommended, and made some beautiful failures. Then he thought it over and found it was not more than thirty or forty years since a similar method was advocated,—another instance of history repeating itself. He found he was unable to turn corners or to restore contour as he could with cohesive gold. He thought that great harm would come from this method unless its use was confined to suitable places.

Dr. M. L. Rhein, New York, was present when Dr. Bödecker filled the tooth for Dr. Watkins, which has been mentioned. He thinks the bloodstone burnisher is better for burnishing in gold than the Herbst instruments. Most of those who saw the operation were of the opinion that the friction of the instrument upon the filling material caused the gold to anneal; it certainly made heat enough, and thus caused the gold to become a homogeneous mass, and Dr. Bödecker was of that opinion at the time. One point that is important is in regard to using this method in a cavity in the neighborhood of the pulp. He should think it would be painful. Dr. Watkins said that he felt nothing at the time of the operation, but this might be explained by the fact that the filling was nearly completed before this method was tried.

Dr. Watkins. In the filling put in by Dr. Timme, every piece of gold from the time he first saw the operation was annealed, and so it was in the case of the tooth filled by Dr. Bödecker.

Dr. S. J. Andres, of Montreal, Canada, in behalf of himself and friends to whom the privileges of the floor had been extended, returned thanks for the courtesies bestowed.

Adjourned.

FOURTH DAY—*Morning Session.*

The special order for the morning session was the election of officers and the selection of the next place of meeting, a report of which has already been printed.

The final reports of the committee on credentials, the treasurer, and the auditing committee were presented and adopted, and the usual votes of thanks were passed.

The newly-elected president, Dr. J. N. Crouse, was installed, and briefly returned thanks for the honor.

Section IV., Operative Dentistry, was passed, and Section V., Anatomy, Histology, and Microscopy, was called. Dr. M. L. Rhein, chairman, made a verbal report expressing thanks for the very excellent paper read by Dr. Williams on Wednesday evening.*

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*See page 641, current number of the DENTAL COSMOS.

Dr. Abbott. In a few points Dr. Williams's paper differs from the opinion that prevails among some of us in New York. Some one has said that it took the same ground that Dr. Black had taken, and that it was inspired by what Dr. Black had written, but he had no question that Dr. Williams's work was done independently of what others had said. Dr. Williams—or any other who works with the microscope—is not going to say some other observer is wrong; at least, not until he has gone over the ground more than once. With reference to embryology, the speaker would disclaim having made any special study; but he would state some points which Dr. Williams claims to have discovered. The first of these is the development of the ameloblasts and the flat layer of cells, the columnar cells disappearing as described in the paper. The next point of importance in connection with the paper is that it was accompanied by the first perfect specimens ever prepared, so far as known, showing all the parts without any break in their continuity. The next point is with regard to the development of the fibrillæ from the extremities of the odontoblasts; sometimes more than one from the same odontoblast. Dr. Bödecker has claimed that, instead of developing from the odontoblasts, the fibrillæ start out of the pulp, passing between the odontoblasts. Tomes formerly held that the odontoblasts are originally a line of cells having the appearance of a link of sausages, the points of which are absorbed, forming a tube, from the sutures of which the fibrillæ start, passing through the intertubular tissue of the dentine. Dr. Bödecker claimed that they passed between the odontoblasts, and the speaker has seen his specimens in which this seemed to be very plainly shown. The difference between Bödecker and Williams was not great enough to cause a controversy. Dr. Williams has seen sometimes one, two, or three processes from the odontoblasts penetrating the dentine and forming the dentinal fibrils in the same tooth. These statements show that, no matter how careful observers are, they will see differently.

Dr. Peirce. In 1838 Goodsir published his account of the development of the teeth, in which he described three important stages, the follicular, the saccular, and the eruptive. He also taught that the little papilla in the primary dental groove was the germ of the tooth. This was the follicular stage. The groove then became arched over, forming the saccular stage, and from the inner surface a gelatinous substance was secreted to form the enamel.

During 1868 Huxley and others came to the conclusion that Goodsir had been led to his conclusions because of imperfect manipulation, by which a portion had been brushed off in the preparation of his specimens, and he thus got the groove. The views which Dr. Williams' paper was intended to combat were presented by gentlemen who were not themselves original investigators of the subject, but who simply accepted Goodsir's views. The work that has been done in this direction is not easily done. A good many men have from time to time engaged in it, but none have worked more independently than Dr. Williams, and the speaker knows of no one to whom more credit is due. He has given his views, though not widely different from those of others, but rendered clearer than any who have preceded him by his admirable illustrations.

Dr. Spalding understood Dr. Williams not to combat the views of others which were antagonistic to his own, but to show how they had made the mistakes upon which their whole case hung. There was no need to combat the idea of a primitive dental groove; that was exploded long ago. In regard to the layer of flat cells, the paper is in agreement with what we know of the histology of other tissues. As to the ameloblasts, it is a question whether they are not reproduced. The flat layer may be converted into them whenever there is occasion for it.

Section V. was passed.

The association adjourned to meet in Minneapolis the first Tuesday in August, 1885.

PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

At the annual meeting of the Pennsylvania Association of Dental Surgeons the following gentlemen were elected officers to serve for the ensuing year:

E. H. Neall, president; Amos Wert, vice-president; Theodore F. Chupein, recording and corresponding secretary and reporter; W. H. Trueman, treasurer and librarian; Howard Roberts, W. H. Trueman, and Wm. Reeder, committee on membership.

Theodore F. Chupein,
Secretary.

CONNECTICUT VALLEY DENTAL SOCIETY.

The twenty-first annual meeting of the Connecticut Valley Dental Society will be held at the Haynes Hotel, Springfield, Mass., on Thursday and Friday, November 13 and 14, 1884.

On Thursday evening the meeting will partake of a social character, with a collation, after which Prof. L. D. Shepard, of Boston, will deliver an historical address, followed by brief remarks from the older members of the society. A full attendance is hoped for to celebrate our twenty-first anniversary.

W. F. Andrews, *Secretary*, Springfield, Mass.

MARYLAND STATE DENTAL ASSOCIATION.

THE second annual meeting of the Maryland State Dental Association will be held in Chemical Hall, University of Maryland, Baltimore, on Thursday, November 13, 1884, at 8 o'clock P. M.

WM. A. MILLS, *Recording Secretary*,
No. 49 South Broadway, Baltimore, Md.

EDITORIAL.

A DENTAL JOURNAL IN RUSSIA.

WE have received information from the publisher that on the first of January, 1885, a dental journal will make its appearance in Russia, entitled *The Dental Review* (*Zoubovratchebnij Vestnik*), under the editorship of Dr. W. Maksimoff,—the first journal published in that country devoted to dentistry. It will be issued monthly, in octavo form, and aim to be "a special organ, designed for doctors and dentists, assuming the task of acquainting the Russian reader with the actual progress of dentistry and with the improvements in dental technics." The price of subscription, including delivery, will be fifteen francs (five roubles) per annum. Further information relating to advertising, etc., may be obtained by addressing the publisher, A. P. Sinitzin, Nevsky 75, St. Petersburg.

THE NEW ENGLAND JOURNAL OF DENTISTRY SUSPENDS.

IN the October issue of this publication the announcement is made that "this number will close the existence of the *New England Journal of Dentistry per se*. Arrangements are effected by which this journal and the *Archives of Dentistry* are to consolidate."

CORRECTION.

THE resolution offered by Dr. McElhaney at the meeting of the National Association of Dental Examiners (see page 559, DENTAL COSMOS, September) should have read thus:

Resolved, That we recommend the dental colleges not to grant free scholarships to State societies, or through the recommendation of the examining boards.

BIBLIOGRAPHICAL.

THE EAR: ITS ANATOMY, PHYSIOLOGY, AND DISEASES. A Practical Treatise for the Use of Medical Students and Practitioners. By CHARLES H. BURNETT, A.M., M.D., Professor of Otology in the Philadelphia Polyclinic and College for Graduates in Medicine, etc.

With 107 illustrations. Second edition, revised and re-written. Octavo, pp. 585. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $4.00; leather, $5.00.

The advances in the science of otology in the seven years which have elapsed since the publication of the first edition of this work have necessitated many alterations, the omission of much material which has become obsolete, and the re-writing of a large portion of the volume. The work seems to be complete in all its parts; is notable for the clearness and precision of its teachings, and includes every recent advancement in the specialty. The symptoms, causes, prognosis, and treatment of diseases of the ear are presented concisely and clearly. The physician will find in this book the kind of knowledge which he needs in daily practice.

A Practical Treatise on Fractures and Dislocations. By Frank Hastings Hamilton, A.B., A.M., M.D., LL.D. Seventh American edition, revised and improved. Illustrated with 379 wood-cuts. Octavo, pp. 1005. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $5.50; leather, $6.50; half Russia, $7.00.

The first edition of this book (1859) was the first complete treatise on fractures and dislocations in the English language. With each succeeding edition there has been a notable increase in practical value, and the volume now before us shows earnest effort on the part of the author to make the discussion of these topics as exhaustive as possible, and the task has been admirably performed. The style of the author, the care with which each subject has been treated, the large clinical experience on which it is based, serve to make the work eminently acceptable as a standard authority.

The Elements of Pathology. By Edward Rindfleisch, M.D. Translated from the first German edition, by William H. Mercur, M.D.; revised by James Tyson, M.D. Philadelphia: P. Blakiston, Son & Co., 1884. Price, cloth, $2.00.

Professor Rindfleisch's work in the original has been held in high esteem as an unusually lucid statement of general pathological processes. The translation, which seems to have been intelligently and conscientiously made, will no doubt be as highly appreciated by the English student. The volume will be prized by all who desire to familiarize themselves with the topics treated.

A View of the Laws Relating to Physicians, Druggists, and Dentists. By Richard J. Williams, of the Philadelphia Bar. Philadelphia: Edmund Q. Bowman, publisher, 1884. Price, $1.50.

The purpose of this book is to give information as to the laws relating to physicians, druggists, and dentists. A large portion of the book is devoted to what is known as the common law, applicable throughout all of the United States. The author has given considerable attention to a consideration of the responsibilities of the practitioner under the law. The important court decisions are recorded, and the appendix contains acts of Assembly of Pennsylvania and ordinances of Councils of Philadelphia relating to the subject.

THE PHYSICIAN'S VISITING LIST FOR 1885 (Lindsay & Blakiston's). Philadelphia: P. Blakiston, Son & Co.

This widely-known annual pays its thirty-fourth yearly visitation, looking if possible neater than ever, and admirably adapted to the wants of the physician. It contains a calendar, list of poisons and antidotes, dose tables, lists of new remedies, diagram for diagnosing diseases of the heart, lungs, etc., and Sylvester's and Hall's methods in asphyxia.

REPORT OF THE COMMISSIONER OF EDUCATION FOR THE YEAR 1882-83. Washington: Government Printing Office, 1884.

The thirteenth annual report of the United States Commissioner of Education, of which we have just received a copy, is a voluminous work of nearly twelve hundred octavo pages. The report proper of Commissioner Eaton occupies about three hundred pages, after which follow "abstracts of the official reports of school officers of States, Territories, and cities, with additional information from various sources," comprising three hundred and fourteen pages. The remainder of the volume is taken up with statistical tables relating to education in the United States.

It would be impossible to examine this volume without being impressed with the rapid progress and development of education not only in our own country but in others. An immense amount of methodical labor and broad intelligence are apparent in the work. An epitome of our State systems of public instruction shows a "total school population in the United States and Territories of over 16,000,000, more than 10,000,000 being enrolled in public schools; the sum of those in average attendance in each State being 6,000,000, under about 290,000 teachers; the whole public school expenditure amounting to over $91,000,000 during the year,—an increase over the figures of the preceding year of about 364,000 in school population, of more than 153,000 in public school enrollment, and of nearly 454,000 in average attendance. Adding the reported attendance in private schools (eighteen States and two Territories failing to report) gives over half a milllion more, making 10,581,700 pupils under instruction during the year. This is twenty-one per cent. of the entire population as given in the United States census of 1880, and about sixty-five per cent. of the youth of legal school age."

PAMPHLETS RECEIVED.

TRANSACTIONS of the Louisiana State Medical Society, at its sixth annual session, held at Baton Rouge, La., May 21, 22, and 23, 1884. New Orleans: L. Graham & Son, 1884.

AN Address on Oral Surgery, delivered before the American Medical Association, by D. N. Goodwillie, M.D., New York.

Reprinted from the Transactions for 1882. Philadelphia: Times Printing House.

CIRCULARS of Information of the Bureau of Education, No. 4, 1884: Proceedings of the Department of Superintendence of the National Educational Association, at its meeting at Washington, February 12–14, 1884. Washington: Government Printing Office, 1884.

ON Branchial Cysts of the Neck, by N. Senn, M.D., Milkaukee, Wis. Read in the Section on Surgery and Anatomy of the American Medical Association, May, 1884. Reprinted from the "Journal of the American Medical Association," August 23, 1884.

OBITUARY.

DR. O. A. JARVIS.

DIED, in New York City, September 27, 1884, OLIVER AMERMAN JARVIS, M.D.S., in the fifty-eighth year of his age.

Dr. Jarvis was of English descent. He was born at Islip, Suffolk county, Long Island, N. Y., but early went west with his father's family, who settled at Painesville, Ohio, where young Jarvis worked on a farm in the summer and taught school in the winter. He attended Geauga Seminary at the time President Garfield was a student there. He subsequently spent several adventurous years in the Southwest, but at the age of twenty-one went to New York, where he studied for six years with his brother, Dr. I. Jarvis, sometimes traveling for practice in New Jersey and Pennsylvania. He has for many years been practicing dentistry in New York.

In June, 1868, Dr. Jarvis was elected president *pro tem.* of the first meeting of the First District Dental Society, State of New York; in the same year was a delegate to Albany to organize the New York State Dental Society, and at its first meeting was elected delegate to the American Dental Association. During the years 1869 to

1873 he held successively the offices of secretary, vice-president, and president of the First District Society. In 1874 he was appointed a member of the State Board of Censors for four years. He received the degree of M.D.S. from that board. He was also for some time president of the New York Odontological Society.

Dr. Jarvis was a man of decided opinions, and during anti-slavery times and the draft riots figured conspicuously in the cause of the negro, being a captain of home guards organized in New York to protect the city. In 1850 he published, at Montrose, Pa., a little volume called "The Family Dentist," which was republished in New York in 1880 under the title of "The Dentist: a Popular Treatise on the Care of the Teeth."

DR. GEORGE B. McDONALD.

Died, at Conneautville, Pa., October 8, 1884, George B. McDonald, D.D.S., in the fifty-fourth year of his age.

Dr. McDonald's death resulted from an affection of the brain, not clearly defined. He had been in the practice of dentistry for thirty-two years, and stood deservedly high as an operator, being well known throughout the profession. He graduated and received the degree of D.D.S. at the Philadelphia Dental College, class of 1874. He leaves a wife and five children, three of the sons having adopted their father's profession, and being now engaged in active practice.

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PERISCOPE.

On the Efficiency of Incandescent Electric Lamps.—We copy the following extract from an article by Horace B. Gale, in *Van Nostrand's Engineering Magazine*, on the general principles which govern the efficiency of an incandescent lamp:

Each of the lamps mentioned consists essentially of a filament of carbon inclosed in a glass globe, from which the air has been exhausted, the ends of the filament being joined to two platinum wires, which pass through and are sealed into the glass. These wires form the connections by means of which a current of electricity is sent through the carbon. The energy which must be expended to force the electricity through the resisting substance of the filament is transformed into heat, which shows itself by raising the carbon to incandescence.

The heat escapes from the carbon filament in three ways: First, a little is conducted away by the connecting wires; second, a still smaller amount, probably, is transferred to the glass by the rarefied gas left in the globe; third, the remainder, which represents practically the whole energy expended in the lamp, escapes from the carbon by radiation. This radiation consists partly of invisible heat and partly of light; and it is clear that the most efficient lamp is the one in which the largest part of the radiant energy is in the desirable form of light. In other words, the efficiency of an incandescent lamp depends solely upon the proportion between the quantity of energy which is given off as light and that which is wasted as invisible heat.

Now, the ratio between the quantity of light radiated and the quantity of heat radiated by any solid body depends upon its temperature. The shape or structure of a body, or the extent of its surface, though influencing the total amount of radiation, cannot affect the proportion of the light and the heat.

By adjusting the strength of the current passing through the carbon of an incandescent lamp, we may heat it as hot as we please. We may raise it to a moderately high temperature without getting any light at all, all the energy expended being wasted in the form of heat; increase the quantity of electricity passing through the filament, and we can bring it to a dull red; again augment the current, and it glows with a feeble yellow light; and now, if the current is made a little stronger, without adding much to the amount of *heat* radiated, the intensity of the *light* becomes enormously increased. The way in which the candle-power rises, as the current strength is augmented, may be seen in the following table, based on a series of measurements made upon a Maxim "B lamp," designed to give about nine candle-power:

Current strength in ampères.	Candle power.	Increments of current strength.	Increments of candle-power.
0·	0·		
0·5	0·	0·5	0·
1·0	(Very dull red.)	0·5	0·
1·5	3·5	0·5	3·5
2·0	17·0	0·5	13·5
2·5	55 0	0·5	38·0
3·0	120·0	0·5	65·0

The efficiency of a lamp—that is, the return we get in light for a given amount of electrical energy—being greater the higher the degree of incandescence to which the carbon is brought, it follows that, by varying the candle-power of any incandescent lamp, we may, within certain limits, make its efficiency as high or as low as we choose. On the other hand, the hotter the carbon is heated the sooner it is disintegrated and destroyed. A gradual transfer of particles of carbon takes place from the filament to the inner surface of the glass globe; the latter becomes darkened, the resistance of the carbon is raised, and finally the filament breaks at its weakest point.

It is worth noting in this connection that, in the experiment referred to above, the Maxim lamp was run for about fifteen minutes at more than ten times its normal candle-power without apparent injury, a fact which speaks well for the endurance of this form of lamp.

While the *efficiency* of an incandescent lamp is thus a matter of temperature chiefly, being greater the higher the temperature, its *durability* depends both upon the temperature and upon the form, structure, and density of the carbon, as well as upon the perfection of the vacuum obtained in the globe. The *relative economical importance* of the efficiency and the durability of a lamp will vary, of course, in different circumstances, according as the cost of the power or the cost of renewing the lamp is the greater; and if we can discover the law connecting the efficiency, length of life, and candle-power of a given form of lamp, we can determine, for each special case, at what candle-power the lamps should be run in order to obtain the greatest economy.

NECROSIS OF UPPER JAW IN TYPHOID FEVER.—Dr. Angel Money read notes of a case of typhoid fever which supervened on rheumatic fever in a boy aged nine years. The typhoid fever set in about six weeks (February 18) after the patient's admission to hospital, and there seemed to be no doubt that the primary illness was of a rheumatic nature. Five weeks (March 22) after the apparent onset of the fever, the signs of necrosis of the upper jaw on the left side were apparent. Several teeth came away, and, after a protracted course, the sequestrum was removed without any mishap on May 30. The sequestrum consisted of a large portion of the superior maxillary and palate bones—necrosis of something more than the mere alveolar border. The patient made an excellent recovery, and a note on June 4 says that no fluid has returned through the nose. It might be remarked that the necrosis seemed to come on during the course of typhoid fever, but it was much more likely that the specific fever had ended its course, and that the pyrexia observed was due to the local mischief about the jaw.

Mr. Parker was of opinion that this case closely resembled cases of cancrum oris, except in the fact of recovery. He had frequently seen a similar occurrence after measles, scarlet fever, and typhoid fever.

Mr. Mahomed had seen two cases in which scarlet fever had been followed by the loss of a portion of the maxilla and some teeth. Clinically, Dr. Money's case bore no resemblance to cases of cancrum oris, for the bone was affected rather than the soft tissues; the process was not a creeping one, and a large area was affected from the first.

Mr. Hulke thought that this was certainly not a case of cancrum oris. The fact that the patient recovered without local treatment was in itself sufficient to prove this.

Dr. Money replied that, though pathologically there might not be much difference between his case and one of cancrum oris, yet that clinically they were quite distinct conditions.—*Proceedings Pathological Society of London, in Medical Times and Gazette.*

MALPOSITION OF A TOOTH.—Dr. de Havilland Hall read notes of the case of a girl, aged fifteen, in whom there existed in the right nostril a misplaced tooth, which turned out to be the right permanent cuspid. There were marked signs of hereditary syphilis, and a fetid discharge issued from the nostrils; the nasal septum was also perforated. The tooth was extracted from its abnormal position three months after it was first seen. Such cases were said to be decidedly rare; but one similar instance is recorded in *The Lancet* of November 3, 1883. Mr. Sewill doubted whether the malplaced tooth could be regarded as the cause of the ozena, for it was quite healthy, and in most examples of misplacement of teeth no inflammation was excited. Mr. Black thought the mode of development of the upper jaw might tend to explain why the cuspid became so altered in position. He asked whether the notion that a third tooth might appear was well founded. The president said that he had seen teeth frequently in abnormal situations, and in his experience they might give rise to inflammation and cysts, as in the antrum, where suppuration was known to occur, and be relieved by operation so that both pus and tooth may be discharged. Dr. Hall, in reply, agreed that the tooth did not set up the ozena, which was no doubt the result of the syphilitic taint. He said also that a third tooth had been described by many writers.—*Proceedings Medical Society of London, in the Lancet.*

Recovery from Necrosis of the Lower Jaw.—Mr. Warren Tay showed a boy who had ten years previously had necrosis of the whole of the lower jaw. The boy at that time was aged four years, and had typhoid fever with ulceration of gums; this led to exposure and ultimate necrosis of the whole of the lower jaw. In five months' time new bone could be felt, and seven months from the onset of the disease he removed the whole of the lower jaw except the condyle on the right side. The patient had, at the present time, a very fair substantial lower jaw; on the left side one tooth was showing. There was no difficulty in taking food. Mr. Tay referred to cases published by Mr. Savory and Dr. Bristowe. It was probable that this was a case of phosphorus-necrosis, as the boy used to suck lucifer matches. And he concluded by referring to a case published by Mr. Simon, where a man got phosphorus-necrosis by sucking pieces of ginger which he kept in a waistcoat pocket along with loose lucifer matches.—*Proceedings Pathological Society of London, in Med. Times and Gazette.*

Two Cases of Death after Extraction of Teeth.—In the *Vratch*, No. 34, p. 523, Dr. V. M. Zakharevitch details the cases of two strong and generally healthy medical men, aged 26 and 24, who died, one on the sixth and the other on the tenth day after the extraction of teeth. In each of the patients the left inferior second molar was removed. In one of the cases osteomyelitis, and in the other osteitis and periostitis, of the lower jaw developed, all the symptons being unusally severe. The author believes that the inflammation from its onset was of a septic character, the wound being septically poisoned by the dentists having employed unclean instruments. In view of these two exceedingly sad cases, Dr. Zakharevitch strongly insists on the necessity of strict antiseptic precautions in tooth-extraction. He makes his patients, before the operation, carefully cleanse their teeth by means of a brush with plenty of soap, and wash out the mouth with one or two per cent. carbolic solution. The carbolic washing is repeated after extraction. When the bleeding is arrested he powders the wounded alveolus with iodoform, puts into its cavity a small plug of wadding, sprinkled also with iodoform, and seals the socket with collodion. All the instruments employed are disinfected both before and after the operation.—*London Medical Record.*

HODGE'S PESSARY IN FRACTURES OF THE LOWER JAW.—Dr. W. J. Naismith (*Lancet*) describes a fracture of the lower jaw at the symphysis, with a transverse wound two inches in length over the mental protuberance. The fragments of the jaw were freely movable, and it was desirable to apply an apparatus which would fix the bone in place immovably, and at the same time allow the wound to be dressed. Accordingly, a Hodge's pessary was brought into use, by bending it so as to allow the chin to protrude through its ellipse. One bar was molded so as to support the fracture anteriorly; the other steadied it from below, while the rounded ends afforded admirable lateral pressure on each side, at a point in front of the angles of the jaw. To the rounded ends of the pessary tapes were sewn, two on each side, over the padding, and secured over the head, or to a fillet, and around the neck by small buckles. For fractures of the inferior maxilla at or near the symphysis, with or without wound, the Hodge pessary seems well adapted. It can be bent to fit any size of jaw, and in the qualities of comfort, lightness, and coolness compares very favorably with the solid, cumbrous appliances included under the head of molds.—*Jour. American Med. Association.*

APHTHOUS STOMATITIS.—This is a disease most often seen in summer, and seems to be due to some fermentative process. It is often preceded by a considerable elevation of temperature (39°-40° C.=102.2°-104° F.), leading to the inference that pneumonia is threatened. Then comes salivation, attended with heat, redness, and swelling of the buccal mucous membrane. The child loses its appetite simply because the presence of food in the mouth causes pain. After twenty-four hours the fever declines, and, simultaneously, small vesicles appear on the mucous membrane of the lips, tongue, and gums. On the first day five or six vesicles are seen, on the second day as many more, and so on. By confluence of these, large pustules are eventually formed. In this case you can see all of these different stages. Salivation is present. Here are vesicles on the lip and tongue, and on the roof of the mouth is a large purulent spot. This is not diphtheria, but confluent aphthous stomatitis. The child infects itself through its saliva, and, in a family where several children use the same glass or spoon, the disease spreads. Hence, aphthous stomatitis is infectious. The prognosis is favorable, though, if the affection lasts for twelve or fourteen days, the child may become emaciated through loss of sleep and appetite. In some cases the larynx may be affected, leading to edema of the glottis, and a consequent diagnosis of diphtheria.

The treatment is simple. Attend carefully to the diet, giving nothing but cold milk until the soreness of the mouth decreases. In no disease is the application of cold more useful. Give the child small pieces of ice, or syringe out the mouth with ice-water. This treatment, according to my experience, shortens the attack. Mouth-washes are often applied with a rag or brush, but wrongly so, for every mechanical injury is harmful, and, by roughly rubbing the mucous membrane, suppuration is induced and the disease prolonged. A solution of chlorate of potassium (1 to 100) may be given in doses of a teaspoonful every two or three hours. This has only a local effect, the idea that it acts through the blood being erroneous. The mouth may be syringed out with a similar solution every four hours. Benzoate, or salicylate, of sodium (a five per cent. solution) is also useful. A solution of corrosive sublimate (1 to 500), applied with a camel's-hair brush to the gums, causes a rapid dulling of the sensibility in cases where the pain is great. The separate spots may be touched with the solid stick of nitrate of silver. It is too painful when the whole mouth is thus penciled.—*Vienna Poliklinik, by Professor Monti, in N. Y. Med. Jour.*

DIFFERENTIAL DIAGNOSIS OF TIC DOULOUREUX AND DENTAL NEURALGIA.—Magitot, of Paris, some time ago expressed the opinion that these two varieties of prosopalgia were clearly distinguishable by their symptoms alone. Tic douloureux he would define as an affection of the cutaneous branches of the trigeminus, occuaring in paroxysms of an intermittent and spasmodic character which are provoked by the slightest contact or movement; while neuralgia originating in the teeth is always increased or diminished by forces acting upon the oral cavity, such as the pressure of foreign bodies, atmospheric air, heat, cold, certain drugs, etc., none of which exert any influence in the case of tic. This view is controverted by Dr. Th. Walzberg, in the *Centralblatt für Chirurgie* November 10, 1883. He maintains that there is nothing specially characteristic in the symptoms of either complaint, and proposes to divide the facial neuralgias into two classes, viz.: those whose causes can, and those whose causes cannot, be determined—the latter answering to the tic douloureux of Magitot. He adduces in confirmation three cases of prosopalgia successfully treated by himself. Concerning the first two of these he observes that they exhibit almost precisely the same assemblage of symptoms, yet that one of them certainly did not originate in the teeth, although presenting all the features characteristic of dental neuralgia, according to the French author. The third case, the symptoms of which would place it in Magitot's first class (tic douloureux)—and which also strongly resembled an intermittent disease—shows that a neuralgia may arise from the teeth, although entirely uninfluenced by agencies affecting the interior of the mouth. Symptoms in these complaints may facilitate the discovery of their causes, and so guide us to a successful plan of treatment, but only the most accurate objective examination in every case will protect effectually against error. It is better to search in vain for a tooth-root, upon the slightest suspicion, than uselessly to divide a nerve. A remark is appended relating to the mode of performing this operation. When it is designed to follow up to any considerable extent the ramifications of the infraorbital nerve upon the cheek, it is better to make the entering (semicircular) incision at a point somewhat below the orbital wall; otherwise a pouch will be formed too small for separate drainage, but large enough to act as a reservoir for the secretions, with the result of setting up a suppuration which will much prolong the process of healing. The latter, under favorable circumstances, should not occupy over five days.—*N. Y. Med. Jour.*

Treatment of Fistulæ of Steno's Duct.—Dr. Edouard Martin has recently published a clinical study of this affection, in which he draws the following conclusions:

1. From an etiological point of view, fistulæ of Steno's duct may be classified almost equally as traumatic fistulæ, and pathological fistulæ following abscess and inflammation.

2. Their treatment varies a great deal according to the indications; it is therefore a grave error to choose any one procedure to the exclusion of all others for a distinct application in these cases.

When the anterior extremity of the canal is permeable, cauterization, aided in some cases by dilatation, may effect a cure. When the anterior extremity is closed, it is necessary either to produce glandular atrophy by compression, or by evacuating the saliva externally (a procedure not without inconveniences, though it has given good results in the hands of Louis, Borel, and Juillard), or else to make an artificial duct. For this purpose Martin believes that simple puncture with a large trocar, followed by the introduction of a large drain left *in situ* for a few days, is sufficient in the majority of cases to insure the permeability of the artificial duct. Should this show a tendency to close up, a canulated sound may be passed, or the duct may be dilated by laminaria. Deguise's method of double puncture, with Béclard's, Gosselin's, Trélot's, or Richelot's modifications, should be reserved for exceptional cases.—*Revue de Thérap.*

Alveolar Abscess of Obscure Origin.—Mr. J. H. Mummery read notes of a case of extensive alveolar abscess of obscure origin. The patient, a strong, healthy-looking young man from Natal, had suffered for more than a year from constant purulent discharge from an opening below the angle of the jaw on the right side, which was a source of great annoyance to him. He had consulted several surgeons, one of whom sent him to Mr. Mummery with a request that he would remove the necrosed roots of the right lower first molar. This was done, but did not affect the abscess. The second molar had a small cement filling, but was to all appearances healthy, as also was the third molar. Six months later the patient returned in the same condition, and now consented to a further examination of the second molar, which was, however, still firm and free from tenderness on percussion. On drilling into the pulp-cavity pus escaped, the tooth was at once extracted, and the sinus healed within a week, and a complete cure was effected. The patient stated that the tooth had cost him between £400 and £500 in traveling expenses and surgical fees.—*Odontological Society of Great Britain, in Med. Press.*

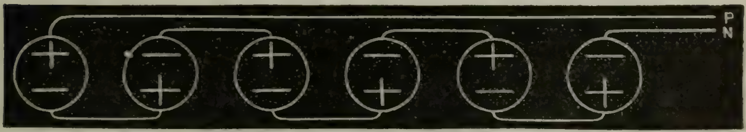
Observations on the Teeth of Certain Rodents.—Mr. Betts read a paper in which he disproved the statement of Professor Hilgendorff, since copied into other works, that the incisors of the Leporidæ had a complete investment of enamel, and showed that the thin transparent layer at the back of the incisors of hares and rabbits was really continued from the cementum and could clearly be demonstrated not to be enamel. Although apparently a small matter, it was of more importance than appeared at first sight, since this supposed fact had been held to show that the Leporidæ were in this respect a missing link between the Rodents and other mammalia, whilst in reality the exact relations of this large class to the rest of the animal kingdom must still be considered an open problem.

The result of Mr. Betts's observations was confirmed by Messrs. A. Underwood and Chas. Tomes, who also commented on the obscure zoological relations of the Rodent class, and the latter suggested that some of the missing links might yet be supplied by a careful study of the marsupials.—*Odontological Society of Great Britain, in Med. Press.*

HINTS AND QUERIES.

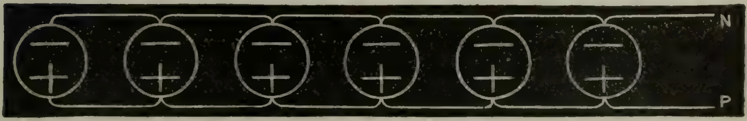
The Coupling of Battery-Cells.—The diagrams below illustrate different methods of coupling the cells of a battery according as it is desired to produce *power* (force, intensity, potential), or for creating a *quantity* current. In diagram No. 1 the cells are coupled in series from zinc to carbon—positive to negative. This method of coupling produces what is called a high-tension current, and is that which is employed for power and for illuminating purposes. In this arrangement each cell, whether large or small, gives a definite potential; and every additional cell gives increased intensity to the current produced, the *number* of cells determining the intensity, without reference to their size or the depth of immersion of the electrodes in the electrolytic fluid. The number of cells necessary to be employed in a given case depends, therefore, on the amount of resistance to be overcome. The unit of measure of electrical force is expressed by the term volt (as the pressure of steam in a boiler is designated by pounds); the unit of the measure of resistance is an ohm; the unit of the measure of quantity is an ampère. In an ordinary bichromate cell, such as the Grenet or a

No. 1.



Battery-Cells Coupled in Series to produce Electro-motive Force or Power (potential).

No. 2.



Battery-Cells Coupled in Multiple Arc to produce a Quantity Current.

plunge battery in which a single fluid such as the electropoion is used, one cell gives a potential of a little over one and three-quarter volts; two such cells give twice that, and so on according to the number of cells,—six cells, when arranged as in diagram No. 1, producing ten and one-half volts. When a current of electricity passes through a conductor which resists its passage, it heats the conductor to a degree proportionate to the resistance which it meets. The thin filament of infusible carbon in the lamp forms a portion of an electric circuit, and because of its low conducting power is heated to incandescence by the passage of the current. The small lamps employed for examination of the mouth offer a resistance of about five ohms, requiring approximately five volts to overcome it. Three cells of an ordinary bichromate or Bunsen battery produce a current of about five volts. The intensity of the current required depends upon the size and character of the carbon filament. A current that would be necessary to produce incandescence in a three-candle-power lamp would destroy the filament in a one-candle-power lamp. To increase the intensity of the current by increasing the number of cells beyond the amount required to overcome the resistance sufficiently to produce incandescence is to risk the destruction of the carbon filament. In lamps of the same size and intended to be alike the resistance is not uniform, owing to a difference in the size or density of the filaments, and the carbon may be destroyed in one by a current just sufficient to produce incandescence in another. It is therefore necessary to employ a resistance device to graduate the flow of the current.

In diagram No. 2 the cells are coupled from zinc to zinc, carbon to carbon —positive to positive, negative to negative. By this arrangement *quantity* of current is produced, according to the number of the electrodes and the amount of their exposure to the electrolytic fluid—the larger the electrodes and the deeper their immersion the greater the chemical action. But, while an increased exposure of the electrodes to the fluid increases the amount of electricity generated, it does not increase the electro-motive force. If the six carbons and six zincs, coupled as represented in diagram No. 2, were all placed in one cell instead of in six, the result would be the same. A quantity current is required for cautery purposes.

To summarize, the potential or intensity of a current depends, first, upon the method of coupling, and, secondly, upon the number of cells included in the series, irrespective of their size and of the depth of immersion of the electrodes; while the production of a quantity current requires a different coupling and depends upon the amount of surface of the electrodes exposed to the fluid, irrespective of the number of cells.

It should be understood that when the battery is placed at a distance from the lamp, as in the cellar or a room at a considerable remove from the operating-room, the length of the connecting-cord necessary makes an increased resistance to be overcome, and in such case an additional cell will probably be required to produce the same effect as when the cells are placed near at hand.—J. W. W.

To the Editor of the Dental Cosmos:

In the October issue of the Dental Cosmos, Dr. W. J. Hewes, of Troy, N. Y., objects to the use of the term "peroxide of hydrogen," employed by Dr. Harlan, in his paper before the American Dental Association at Saratoga, to designate the compound H_2O_2, and in support of his position says: "Now, H_2O_2 is not a *peroxide* at all. Since the value of oxygen has been advanced to sixteen, or doubled, water is not now the protoxide HO, but, according to the old system, really a suboxide, H_2O, while the peroxide formerly written HO_2 becomes the protoxide H_2O_2 or HO."

The doubling of the old atomic weight of oxygen resulted from the discovery that a single atom of O always combined with two atoms of H, due to the fact that its valence, a property of atoms entirely distinct from their atomic weights, was twice as great as that of H. The relative proportions by weight of H and O in water, according to both the old and new nomenclature, are precisely the same, viz.: 2 : 16, or, reduced to its lowest terms, 1 : 8; while in the hydrogen peroxide H_2O_2, which Dr. Hewes calls the protoxide, the formula of which, by the old notation, is HO_2, the relative proportions by weight are likewise the same, being in the first instance 2 : 34, and in the latter 1 : 16. When an atom of variable equivalence enters into combination with O, the prefix "per" is frequently used to designate the higher one, as in the oxygen compounds of mercury, copper, iron, manganese, tin, etc., and its use in the case of the higher oxygen compound of hydrogen is therefore entirely justifiable. The use of the suffixes "ic" and "ous" to the positive atom of binary compounds, when it enters into combination with more than one equivalence, is perhaps less confusing, besides expressing more fully the characters of the compounds. Dr. Hewes uses the two formulas H_2O_2 and HO to express the compound hydrogen peroxide, or, as it is sometimes called, free hydroxyl. The formula HO, as applied to this compound, is inadmissible, as it expresses an unsaturated compound, or, in other words, a chemical impossibility. Both theory and the determination of its molecular weight show that its molcule is composed of two hydroxyl groups in combination with each other, represented graphically thus, H-O-O-H, and its formula is properly written H_2O_2. The term "peroxide" is used in connection with this compound by Barker, Roscoe, Remsen, Richter, and Attfield. Hydrogen peroxide is a compound differing so diametrically in its chemical, physical, and physiological properties from water, that it seems scarcely within the range of possibility that anyone should use the former with the same freedom that we are accustomed to use the latter, even should it be accidentally called a peroxide.—EDWARD C. KIRK, D.D.S., *Philadelphia, Pa.*

TO THE EDITOR OF THE DENTAL COSMOS:

Dr. W. J. Hewes, under the heading of "Inexact Notation," in the October number of the DENTAL COSMOS, criticizes Dr. Harlan's paper on "Pyorrhea," saying that the doctor's use of the symbol H_2O_2 to indicate hydric peroxide or peroxide of hydrogen is unscientific and liable to mislead young and old practitioners.

In justice to Dr. Harlan, I wish to say that he uses the new nomenclature in a truly scientific sense. According to the best modern authorities on the subject of chemistry, water (H_2O) is an oxide of hydrogen, belonging to the third class of oxides, termed the indifferent oxides, because they are neither acids nor bases, and H_2O_2 is consequently a peroxide of hydrogen. It seems that Dr. Hewes must have read Dr. Harlan's paper very carelessly to have fallen into error in interpreting his meaning, as no reference to the old nomenclature is made. One point in regard to commercial peroxide of hydrogen which both gentlemen fail to mention, is that a very small quantity of HCl (hydrochloric acid) is added to the peroxide of hydrogen, when made, to make it more *stable*. Unless this precaution is taken, the peroxide is rapidly deprived of its oxygen at ordinary temperatures. It is best to keep the peroxide at a temperature *below* 50 degrees Fahrenheit. At 70 degrees the preparation is rapidly decomposed into oxygen and water (Bloxam).
—DENTON E. PETERSON, D.D.S.

In the report of the Odontological Society of Pennsylvania, in the Dental Cosmos for October, page 615, Dr. Guilford asks the composition of "Doble's Solution." The formula is as follows:

℞.—Carbolic acid, grs. xxiv.
Biborate of soda,
Bicarbonate soda, *aa.* grs. xl.
Glycerin, f℥. ij.
Water, Oj.

It is much used in the treatment of chronic nasal catarrh, chronic catarrhal pharyngitis, etc. In treating the nasal mucous membrane, the solution is used by snuffing it. For the pharynx, it is applied in the form of a spray, used once or twice daily.—John L. Gish, M.D., *Ann Arbor*, *Mich.*

Salicylic acid, applied with a small pencil to the necks of the teeth following the removal of the deposits of salivary calcululi, has proved a most beneficial treatment in my practice, and especially so since I began the use of the acid made from the *true oil of wintergreen* in saturated solution (1 to 2) with alcohol. Most of the commercial acid is made from carbolic acid (a few drops of oil of wintergreen being well rubbed in to give it the odor). The pure acid, unbleached, being the best, will be recognized as slender, needle-shaped, straw-colored crystals, having neither the smell nor taste of wintergreen, but rather astringent, provoking a free flow of saliva.—Frank W. Low, *Attica*, *N. Y.*

To the Editor of the Dental Cosmos:

Edwin Bergstresser, D.D.S., of Hagerstown, Md., in the September number of the Dental Cosmos, complains that the dental law of the State of Maryland is "malicious" or "unjust." It is not so, though it may pinch some who would evade its scope and range. The design of the clause of which he complains—that which compels all graduates of schools *outside* of the State to pass an examination before the State board before practicing in the State—is simply intended to sift the wheat from the chaff, and keep the practice of the profession in Maryland in reputable hands. The law in question condemns no dental college "outside of the State;" but, as there are dental colleges outside of Maryland whose diplomas are disreputable, and as it is beyond the function of a law to designate or legislate on such by name, *all* are theoretically placed in one class, as no law can discriminate in such matters. The State board of examiners, however, can do so, and in other States have done so, as in Illinois, as it is well understood by those to whom the discriminating process is to be applied.

The two Maryland colleges were exempt for the sufficient reason that, being chartered by the Legislature which passed the dental law in question, that Legislature could scarcely do otherwise than exempt them. These two colleges are chartered as such by Maryland law, and vested with certain powers, and I think it likely that a law which trenched on these charters would be self-abrogating.

Those who framed the law quite well knew the high standing of "probably a dozen other dental schools," and had not the slightest idea either of framing a "protective law for a Maryland industry," to use a current political phrase, or of preventing any reputable holder of a reputable diploma from seeking Maryland as a field of work. They do not even think that, in fairness and justness to the profession, even those holding Maryland diplomas should be exempt from a sifting by the State board. The laws regulating the practice of medicine in some States drags *all* before the State boards, no matter where graduating, and such a law in dentistry would be a wholesome check on dental colleges.—Dental Law.

EXPLANATION OF PLATE.*

(See Article on "The Embryonic Malpighian Layer.")

Figures 1, 2, 3, and 4 are made from the same slide, and show a vertical transverse section of a pre-molar and the surrounding jaw of a 10-centimeter pig, injected. Fig. 1 is magnified 30 diameters. Figs. 2, 3, and 4 are magnified 250 diameters. The portions from which Nos. 2, 3, and 4 are taken are shown in Fig. 1. N, of Fig. 2, shows the line marked No. 2 in Fig. 1. Fig. 3 is taken from the part marked No. 3 in Fig. 1, and Fig. 4 from the line marked No. 4 in Fig. 1. These points, Nos 2, 3, and 4, mark the center of the focus, and a circle of tissue is shown surrounding this center.

Fig. 5 is a vertical transverse section of the jaw of a rabbit, and shows a vertical section of an incisor tooth. This figure is magnified 60 diameters.

The enamel organ, F, is constantly supplying the spheroidal cells from which the ameloblasts are developed.

A—Ameloblasts, showing Tomes's processes extending into space H.

B—Odontoblasts.

C—Dentine, surmounted by thin layer of enamel, the enamel showing lighter in the print.

D—Pulp, with injected blood-vessels.

E—Spheroidal cells that originally composed the outer tunic.

F—Persistent enamel organ, with stellate reticulum.

G—Developing bone of jaw.

H—Spaces caused by shrinkage.

I—Cement organ.

J—Developing alveolar walls.

K—Cord for permanent tooth.

L—Space from which fully-calcified enamel has been dissolved by acids.

M—Submucous or connective tissue.

N—Spheroidal cells constituting youngest Malpighian layer.

O—Older Malpighian cells.

P—Inner layer of enamel organ, formed of spheroidal cells.

Q—Stellate reticulum.

R—Outer layer enamel organ, breaking up.

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* The Plate is printed from photo-micrographs made by W. H. Walmsley.

Fig. 3.

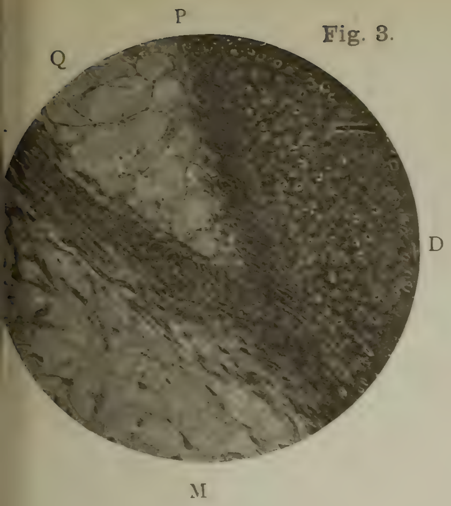


Fig. 4.

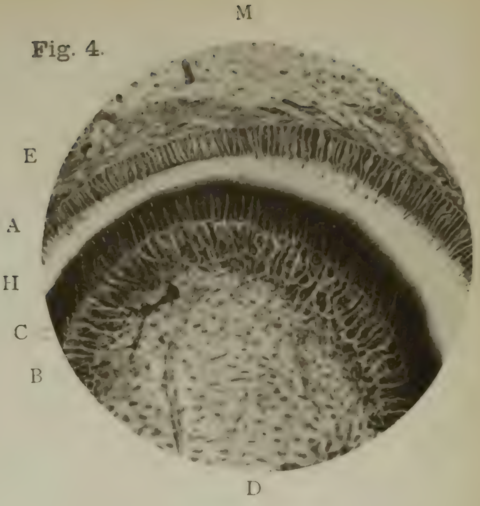


Fig. 2.

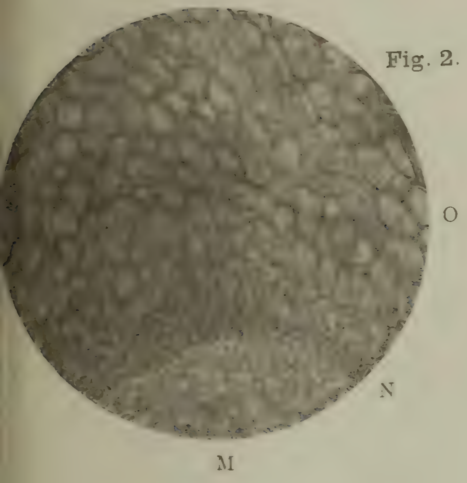


Fig. 5.

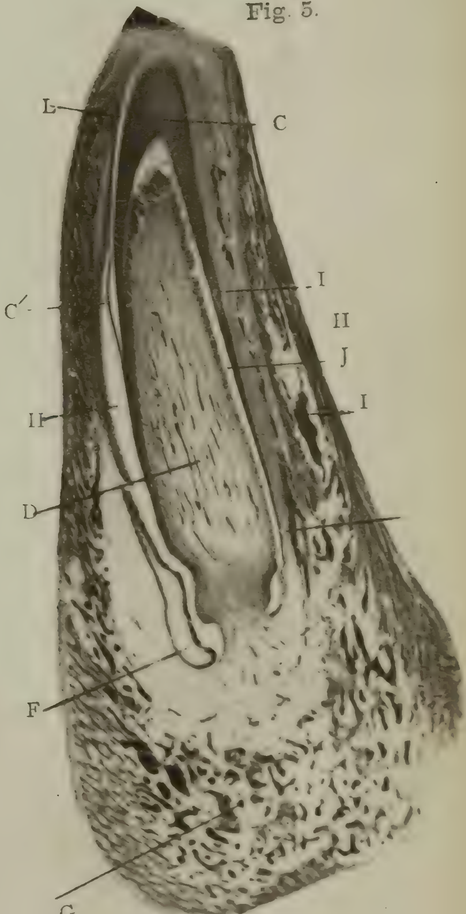
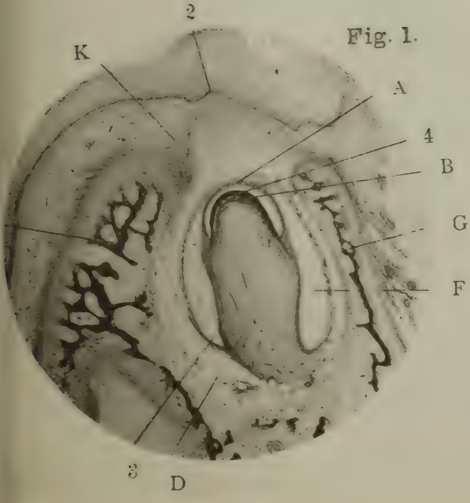


Fig. 1.



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ORIGINAL COMMUNICATIONS.

THE EMBRYONIC MALPIGHIAN LAYER.*

BY W. XAVIER SUDDUTH, D.D.S., PHILADELPHIA, PA.

THE epithelium constitutes the superficial layer of the skin. In the adult tissue the epithelium is composed of two layers of cells,—a younger, which lies at the deepest portion, and an older, at the surface,—the "outer or horny layer, consisting of very thin, transparent, tough, scale-like cells, which present, for the most part, no nuclei, and are packed closely together; and the inner layer, the so-called mucous or Malpighian layer, consisting of larger and smaller nucleated cells of varying shape and character. In the deeper portion, adjoining the corium, the cells are more or less cylindrical; above this they are spheroidal, or polyhedral, or elongated; still nearer the surface they become flattened and finally merge into the thin cells of the horny layer. In the middle zone the cells present a peculiar jagged outline, looking as if they were bordered by short, delicate spines, by which the cells appear dovetailed together. These spined cells—called prickle cells—are very characteristic of this part of the epidermis, and are also found in certain other parts of the body where stratified epithelium occurs, as in the vagina, mucous membrane of the mouth, etc."—(Prudden.)

"The mucous membrane" (of the mouth) "and the skin are anatomically analogous and continuous structures. The first clothes the internal and the other the external surface; and the description of the one will, with slight modifications, apply to the other. In a general sense, they are composed of two strata, or layers, the dermis and the epidermis; yet for convenience of description, rather than for any other reason, they have been variously subdivided. The external stratum, the epidermis, composed entirely of epithelial cells, has been described as consisting of two layers,—the external being termed the corneous, and the internal the Malpighian. The 'scarf-skin' raised on the external surface of the skin by a blister, and the pellicle detached from the palate by hot drinks, represent the corneous layer of the epidermis. By some authors this is called the 'true epidermis,' and by some the 'cuticle.' This layer is composed of the old epithelial cells which have ceased to perform any of the vital functions. The subjacent layer, formed of living epithelial cells, which vary in form and size, is denominated (among many terms) the stratum Malpighii."—(Dean's "Dental Follicle.")

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* See accompanying Plate.

These descriptions apply to adult tissues. Let us turn now to the consideration of embryonal tissues, for it is with the latter that we have to deal in the study of the development of the teeth. I have given the former in order that we may contrast the two and thereby more readily point out where the error has arisen.

The embryonal mucous membrane differs very essentially from the adult tissue. There is a complete absence of the horny layer, and we find the gums covered only with the Malpighian layer of cells. These latter cells may be divided into two classes,—the infant cells constituting the deeper, and the mature cells the superficial, layer. According to Henle, "the deepest layer appears like a stratum of protoplasm regularly studded with nuclei." Columnar or prismatic cells do not appear in the embryonic Malpighian layer.

Zeigler, speaking of the youngest embryonal cells, says: "The cell by itself appears originally as a microscopic mass of pale, slimy, finely granular matter,—the so-called protoplasm. It usually contains within it a nucleus,—that is to say, a structure like a tiny vesicle, whose form may be round, oval, rod-like, or irregular, and in whose interior we can make out by proper handling: 1, small definite bodies, the nucleus corpuscles; 2, a net-like framework of nucleus substance; and, 3, a clear fluid, the nucleus juice. The young cell is at first naked. Only in its maturer stages does it develop on its surface an optically distinct membrane or other structure, according to the special tissue of which it forms a part." This accords with my own observation. The deepest part of the epithelial layer of the mucous membrane of the mouth in the embryo is formed of a layer of protoplasm, which is conspicuous in preparations stained with hæmatoxylon and eosin, in that it stains more darkly than the surrounding tissue. This is shown very plainly in the Plate, Fig. 1, No. 2, and in Fig. 2, N. In this protoplasmic basis-substance are found small spheroidal cells, sometimes arranged in a regular layer, in which case they sometimes assume a somewhat oval shape; in other cases the dark-stained layer of protoplasm is wider, and several layers of spheroidal cells exist,—not arranged in strata, but presenting an irregular appearance, and in some instances being four or five cells deep. These spheroidal cells have no distinct cell-wall or membrane, and the surrounding protoplasm presents no characteristic feature. The younger cells of the Malpighian layer take the stains similarly to the embryonal connective-tissue cells lying immediately beneath, in the submucous layer, and at this stage present the same shape, and can be seen in the pig embryo, 1½ centimeters in length. The older cells, which are seen as we approach the surface of the epithelium, develop a distinct cell-wall, and present an imbricated border, which unites them to their fellows.

It will be seen from the foregoing that I take decided issue with those authors on dento-embryonal histology who speak of the *embryonal Malpighian* layer as consisting in its deeper part of columnar or prismatic cells previous to the formation of the prismatic ameloblasts. Among such authors are C. S. Tomes, "Dental Anatomy," page 129: "In a certain sense there is a groove, which is almost filled up with spherical or flattened cells,—the deepest layer being, however, columnar cells. The cells upon the periphery are columnar, polygonal cells, occupying the central area of the enlargement." The late Dr. Dean, in his "Dental Follicle," page 58, says: "The band is composed of the same histological elements that constitute the epithelial coat of the oral mucous membrane,—that is to say, of nucleated cells rendered polyhedral in form by reciprocal pressure; and that portion which penetrates the tissues of the jaw is bounded by a continuous layer of prismatic cells." Also, in a note under cut No. 20 (showing lamina), he says: "The prismatic and polygonal cells are beautifully drawn in this figure." He also speaks of the prismatic or columnar cells of the lamina as "a continuation of the lower layer of the Malpighian stratum." Dr. J. L. Williams, in the April (1884) number of the Dental Cosmos, says: "If an imaginary line be drawn through the cuboidal layer of epithelial cells, directly over the position which will be occupied by the future jaws of the embryo, it will represent the first observable indication of the development of the teeth. These cells, in obedience to the law of typal requirement, begin to increase rapidly in size. This growth forces the columnar layer of cells downward and the flat layer upward." Again: "The lamina is produced not by an inward growth of the prismatic cells at this point," etc.

These quotations are sufficient to show the positions taken by these writers. I do not know why they should make these statements, unless they have taken for granted the correctness of the statements of other writers, without proving them by actual observation on serial lines of slides, for it is only by the study of closely ranging serial slides that we can follow the stages of metamorphoses. Let us briefly note such a series. In the fetal pig, 1½ centimeters long, there is no indication of the formation of the teeth as yet, but the Malpighian layer of cells is plainly shown. In the next of the series, 2½ centimeters, we find, in the deepest part of the epithelial layer, which corresponds to the line where the band is to be formed, that the infant cells have multiplied in very great numbers and in such manner as to raise a ridge of epithelium on the surface of the gums, and at the same time to depress the submucous tissue of the jaw. This thickening of the layer of spheroidal cells also occurs at the deepest part of the band previous to the giving off of the lamina, and is seen in pig, 3 centimeters. We also find it at the deepest portion of the cord, before the process of invagination commences,—pig, 4 centimeters. This multiplication of the infant-cells, which in the first instance caused the depression of the submucous tissue, now compensates for the expansion of the protoplasmic layer that forms the outer wall of the cord. This process continues up to the time of the development of true prismatic cells or ameloblasts (Fig. 4, A), which is concomitant with the breaking up of the outer tunic and the stellate reticulum as such (Fig. 4, E). Previous to the formation of the ameloblasts in the rodent's tooth, the inner tunic is made up of from three to four cells, arranged as before described, on the outer boundary of which an equally thick layer of spheroidal cells appears, being also densely packed. Outside of these is the fibrous connective-tissue envelope.

This dense layer ef spheroidal cells grows thinner towards the cutting edge, until at such a point as the prismatic ameloblasts are fully formed, where it disappears, and we find the fibrous connective-tissue layer, with its numerous capillaries in apposition to the ends of the ameloblasts. The office of the spheroidal cells, in this instance, is to develop ameloblasts to supply the places of those which were carried up with the growing tooth, enamel being developed only on the labial face, which represents almost a straight line. The extension of the line of ameloblasts is from the first-formed enamel prism nearest the base of the tooth, and here we find located the supply which replaces such extension.

In the development of teeth, where the enamel is to form a coat of mail on the crown of the tooth (viz., the carnivora), the line of ameloblasts that is first formed does not represent the same number of ameloblasts that will finally complete the process of calcification. The outer circumference of the developed enamel is many times larger than that of the first calcified layer. If this represented a straight line, as the enamel on the rodent's tooth does, then the space would be made at one end of the line; but here it is in the form of the greater part of a circle. The expansion occurs at all parts, and the cell supply from which the ameloblasts are developed is found lying in close proximity to the ameloblasts. Along the side of the enamel organ which forms the straightest line fewer cells are found than on the upper arc of the circle, where the expansion is greatest.

By reference to Figs. 2, 3, and 4, it will be seen that the appearance of columnar or prismatic cells is confined to that portion of the developing tooth where the enamel is being calcified (Fig. 4, A). They do not appear in the Malpighian layer of the mucous membrane (Fig. 2, N); neither do they show at the deepest part of the enamel organ furthest removed from the apex (Fig. 3, 1). The cells at the very lowest point of the enamel organ present a flattened appearance, due to lateral compression, but just above they assume an oval shape.

The change from spheroidal cells to columnar or prismatic ameloblasts is accomplished so gradually that it is very difficult to show where the spheroidal cells end and where the ameloblasts begin. The change is one of progression and not of retrogression.

There has been considerable confusion regarding the outer tunic of the enamel organ. Waldeyer says: "As far as the external epithelium reaches, the adjoining connective tissue exhibits its tolerably regularly formed vascular papillæ, which project into the epithelium, and correspond to the papillæ found in the remaining portion of the oral mucous membrane." He also presents a wood-cut (Stricker's "Histology," Fig. 122, No. 3), which does not represent the true condition of the enamel organ in this stage of development, either in the human or porcine fetus. He neglects, however, to state the age or length of the fetus,—two essential points to be considered in presenting illustrations. This cut has been extensively copied, and those who have used it have also neglected to locate it.

As seen in Fig. 3, R, the outer tunic, as such, disappears about the same time as the beginning of the calcification of the first layer of enamel. This is very nicely shown in Fig. 1, A. At this point the ameloblasts are fully formed, and lying on them we find a layer of spheroidal cells, formed from the outer tunic and the stellate reticulum of that part of the enamel organ which was situated immediately above the apex of the tooth. The cells are shown more highly magnified in Fig. 4, E. They present an irregular arrangement, lying in the loose connective-tissue envelope that surrounds the follicle.

In the study of serial lines of slides from human fetuses, ranging from 2½ to 3, 4, and 5 months; in the pig embryos, 1½, 2½, 3, 3½, 4, 5, 6, 7, 8, 10, and 12 centimeters; and in calf embryos running about the same, I have never been able to demonstrate the following statement of Dr. J. L. Williams, who says: "It can be demonstrated from my photo-micrographs that the columnar or inner layer of epithelial cells of the enamel organ undergoes a kind of 'retrograde metamorphosis,' by which they are converted into a sheet of embryonal or indifferent tissue. From the lower part of this sheet of indifferent tissue are developed the ameloblasts; from the upper part of this sheet is developed the flat layer of cells which are calcified as Nasmyth's membrane." In the first place, his premise, that the inner layer of the enamel organ is composed of columnar cells, is entirely wrong, as I have already shown. In the second place, if such a change does occur, we should be able to demonstrate it in some portion of the enamel organ on the labial face of a continuous growing tooth from the jaw of a rodent (a rabbit, for instance, Fig. 5). It is in the development of the enamel in these animals that the most crucial test is made of all theories. Here we have every stage in the development of the enamel represented, from the fully-developed enamel organ with stellate reticulum at the base of the tooth (Fig. 5, F) on up towards the cutting edge, passing through atrophy, condensation, and hornification into cuticula dentis. In the study of these slides I have never been able to demonstrate what Dr. Williams asserts to be the facts in the case.

HYDROCHLORATE OF COCAÏNE, THE NEW LOCAL ANESTHETIC.

BY J. MORGAN HOWE, M.D.S., M.D., NEW YORK, N.Y.

At the Ophthalmological Congress recently held in Heidelberg it was demonstrated that a two per cent. solution of the hydrochlorate of cocaïne, dropped into the eye, produced complete local anesthesia, so that a probe was pressed into the cornea until its surface was indented, and the conjunctiva was rubbed and seized with forceps without producing pain. This condition of the sensory nerves lasted for about fifteen minutes, when sensitiveness began to return, and there resulted no irritation of any kind from the solution. Since the news of this wonderful discovery reached this country, and was published in the *Medical Record* of October 11, medical men have vied with each other in demonstrating the local anesthetic properties of this drug in operations on the eye and other tissues and organs of the body, especially on mucous surfaces. It is not strange that many dental practitioners here have thought of testing its applicability to dental tissues. The drug has been and is very scarce in this market, but I was able to obtain a small quantity of a two per cent. solution on October 20, with which I began experimenting the next morning, and will detail some of the results.

A young man had a large approximal cavity in a bicuspid; the dentine was sensitive, the patient nervous and afraid of pain.

After adjusting the dam and drying, the solution was applied; after ten minutes, tested with an excavator. I thought there was some anesthetic effect, but the patient would hardly admit it. After five minutes' more trial there were no such decided results as to be very encouraging. In the same mouth an application was made to a partially devitalized pulp in a lower molar, and attempts were made to remove it, but without success, although I felt certain there was a decrease of sensitiveness. From this time experiments were made with rather discouraging results, the patients being nervous and loath to admit favorable results so long as any pain was experienced, and I was careful not to influence the mind of the subjects. On October 25, however, on applying the solution to a very sensitive cervical cavity in a cuspid, in the mouth of a very intelligent lady, the testimony was decided and positively favorable. Pain was not entirely abolished, but the preparation of the cavity was concluded with much less suffering on the part of the patient than I had ever witnessed in any similar case. My hopes were so far confirmed that I concluded to ask a few professional friends to join me in the experiments. I made applications to several sensitive cavities during the next three days, with some anesthetic effect in each case, but the results were not very satisfactory. In all cases previous to this time I had allowed the solution to remain, moistening the cavity—while I cut the dentine—with the idea of its continued action. In preparing a very sensitive cavity on October 29, the hoped-for abolition of sensitiveness seemed to be entirely wanting, and while slowly cutting, as I was able to do, the cavity became very dry, and sensitiveness diminished in a marked degree. Afterward, on the same day, a young Miss presented, having deep grooves across the central incisors, from arrest of enamel development, one of them having become so sensitive that she could not brush it without pain. After adjusting the dam the cocaïne solution was applied to this groove, and the preparation of another tooth for filling was commenced; but after several applications and the lapse of nearly half an hour, no lessening of sensitiveness was perceptible while it was moist with the solution, but when I allowed it to become perfectly dry, all sensation disappeared when it was touched or rubbed with an excavator. A few days afterward this young Miss informed me that the anesthetic effect on the dentine lasted through the whole evening, so that she could rub the groove with her nail without sensation; but the next morning it was as sensitive as ever. At this time, and at a subsequent sitting of the same patient, in cavities in molars, I failed entirely to get any decidedly favorable results from the cocaïne solution, either while the cavity was wet or dry. Another case presented similar peculiarities,—

that of a young lady with a cervical buccal cavity in the second superior bicuspid, which was exquisitely sensitive. The solution had very marked anesthetic effect, so that the preparation of the cavity caused almost no pain. On a later day, for the same patient, the same application was made to approximal cavities in molars with very little apparent effect. An application to exposed cementum, on the labial surface of a cuspid, where no decay existed, was quite successful in relieving all sensitiveness for the time.

In a letter to me dated November 6, 1884, Dr. S. G. Perry says of the solution of cocaïne salt:

"On October 27, the day on which you handed to me the hydrochlorate of cocaïne, I used it for the excavation of sensitive dentine for four patients. It was successful in each case,—markedly so in one case, that of a physician who came begging me to delay operating upon a left superior bicuspid until he or I could get for trial some of the new local anesthetic. He was delighted when I told him that I had a few drops of the medicine, and would try it at once. The cavity reached very near the pulp, and was very sensitive. It had been painful more or less for some days, and he shrank from any disturbance of it. After applying a drop of the medicine and waiting a few moments, I was able to excavate the cavity very thoroughly without causing him pain. He said it felt as if I was cutting upon a dead tooth. The tooth was filled with oxyphosphate of zinc, and he left the office a firm believer in the new anesthetic. I saw him yesterday, and he reported the tooth in every way comfortable. The other three cases were those of cavities of marked sensitiveness, and in each one there was almost entire freedom from pain in excavating after the medicine had been applied for a few minutes.

"The next morning I had an opportunity of applying it to the extremities of the pulp in the roots of a superior left molar. The bulbous portion of the pulp had been devitalized and removed, but there was persistent vitality at the extremities of the roots. The medicine was applied, and after a few moments it was possible to pass the broach beyond the points in the canals where pain was felt at first. By persistent effort small portions of the pulp were drawn out, until finally the broach was distinctly felt to reach the closed end of the roots. There was some bleeding, which ceased soon after the canals were cleaned by shreds of cotton rolled upon the broach. There was practically no pain during this operation.

"My next case was that of a lady who desired crowns placed upon the roots of the two superior centrals. The pulps were not exposed, but the teeth were very badly decayed and very much broken down, so that fillings of any kind would have been only a source of distressing deformity, and I was quite ready to accede to the lady's wish. I determined at once to try the medicine. The dam was applied, and after the softened, discolored dentine was removed and sensitive places reached, the medicine was applied and the patient directed to tell me when pain was felt in excavating. Sharp, spoon-shaped excavators were used, and the dentine was cut away in one cavity and then the other until sensitive places were reached, when the medicine was again applied. This was repeated until the pulps were exposed. After this more rapid progress was made as the soft pulp-tissue seemed to come more readily under the influence of the medicine. In the left central a pulp-stone was encountered and removed. This pulp bled more freely, and after the nodule was removed the pulp yielded more readily and was removed first. The pulp in the other one required more of the medicine, and considerably more time was consumed in its removal. In cutting through the dentine, when pain was felt the medicine was applied, and the other tooth was operated upon. The pulps were teased out little by little with delicate piano-wire broaches, made with delicate hooks on the ends. Considerable bleeding was encountered, and this seemed a hindrance, as it diluted the medicine—which you informed me was only a two per cent. solution. The closed extremities of the roots were reached, and the canals well swabbed out with shreds of cotton, which were rolled on the broaches and rotated in the canals to entangle and remove the torn parts of the pulp, in one hour and fifteen minutes from the time the patient took the chair. During this operation no pain worthy of the name was felt by the patient. She said that the putting on of the dam with the floss silk hurt more than any other part of the operation. There was no chance for the imagination of the patient to have a bearing on the case, for she did not know what I was doing until the pulps were laid bare and the pulp-stone removed. Then, being impressed with the remarkable power of the medicine, I called my associate, Dr. Wm. Woodward, into the room, and, in explaining to him what I had done, she became aware for the first time of the exposed condition of the pulps of her teeth. When she left my office there was no trace of vitality in the canals of either of the teeth. The broach could be passed up to the closed ends of each of the roots; the canals seemed to be entirely clean, and the bleeding had about ceased. When she came back, the next day, at the extreme ends of each of the roots there was a little sensibility and a little trace of fresh blood after exploring with the broach. There was no doubt in my mind but that there was a very little of the extreme ends of the pulps left in the roots, and that these had regained sensibility after the influence of the medicine had passed away. Another application of the medicine enabled me in a few moments to remove all that was left, so that the next day after this when she called there was no trace of vitality. The teeth are now filled with wax and gutta-percha, waiting until I can get time to complete the operations upon them. I saw them to-day, and they are, and have been from the first, perfectly comfortable.

"Such unvaried success with the medicine gave me great confidence in its power, so that I was quite unprepared for the failure which followed its use the same afternoon. A young lady for whom I used it in excavating several cavities in the incisors insisted that it did no good whatever. I have also used it several times since in cases where it seemed that no effect was produced upon sensitive dentine. In one case I had no success with it until the cavity had been thoroughly dried with hot air. Then I cut quite freely without pain.

"I have been greatly interested in the testimony of patients after its use. One lady said it gave her tooth a dreamy, far-away feeling. Another said it gave her tooth a strange, numb feeling, like that of a stiff joint that was regaining use and sensibility. I have used it several times when it seemed to operate upon the softened dentine, but was inoperative when the dense structure of the tooth was reached. Its variable action has greatly puzzled me. I am at a loss to account for such undoubted anesthetic effects in some cases and the absence of such effects under seemingly similar conditions in others. But the facts which I have related have impressed me with the belief that this new remedy will play an important part in our list of dental remedies. One must trust the evidence of their own senses, and I have seen enough of its effects to satisfy me that it is a remedy that should receive our most earnest attention. I congratulate you, my dear fellow, upon probably being the first to use it upon the teeth."

Dr. C. F. Ives reports:

"My successes and failures are about equal. I find thus far that it works most effectively in teeth above mediocrity in quality, and in patients over twelve years of age. In younger patients, with soft, white teeth, I have had no success whatever. I had great hopes that it would be useful in removing the pulps from teeth after the application of arsenic, but thus far it has not been successful. I find that the employment of warm air in the cavity is of great assistance."

Dr. E. T. Payne, in a letter dated November 6, says:

"Having used it in numerous cases, my successes encourage the belief that the drug will be found of great service in our profession. I will detail two cases: Dr. S., of this city, called to get relief from a twelfth-year molar, in which the pulp was nearly exposed. After adjusting the rubber-dam and removing the accumulations in the cavity, I found the dentine extremely sensitive. The doctor told me he had used the cocaïne successfully in the removal of hypertrophy in the nostril, and inquired if my attention had been called to it. It was my intention to use it without his knowledge, but, as that was no longer possible, I did it with his consent. On a piece of spunk I carried enough of the two per cent. solution to the cavity to flood it, and allowed it to remain ten minutes; then, drying the cavity, I prepared it to my full satisfaction without his flinching in the least. The cavity was filled with gutta-percha after wiping it with creasote. There has been no appearance of trouble since, although the pulp was nearly exposed.

"Another interesting success was that of a young lady for whom I had occasion to fill a lateral incisor. After adjusting the rubber-dam, I found a cavity with very sensitive dentine. In order to get exact data, I prepared one part of the cavity before using the cocaïne; then, with a piece of cotton, I saturated the cavity, and, pretending to be obliged to be excused, I left the patient ten minutes. On my return I dried the cavity and continued the preparation, without the demonstrations which characterized the first part of the cleaning and shaping. This I consider a fair test, for the reason that the patient did not know that a drug of any kind was used.

"Some failures and some comparative failures induce the belief that the two per cent. solution will not prove of great benefit except in cases where there is great vascularity. With a concentrated preparation I have bright hopes, in most cases where a local anesthetic is desirable."

Since the receipt of this interesting though variable testimony as to the value of the very weak solution of cocaïne salt, Dr. Ives obtained what was represented to be a four per cent. solution, and some of a ten per cent. solution, which he kindly shared with me. A few trials with these preparations seemed to indicate that they were no more certain in their action than the weaker solution; but these latter were prepared here from the coca leaves, or fluid extract, and I suspect that the attempt to isolate the alkaloid was only partly successful, and that the drug was unreliable. Merk's alkaloid is nearly white, and the crystals of the salt make a colorless solution. There are two salient points in the record of these experiments to which I will call attention.

First, there were many instances in which almost complete loss of sensitiveness in dentine was produced, and the removal of two living pulps without pain by Dr. Perry is no less remarkable than any of the operations that have been performed on the eye. The lady for whom this was done called on me and told me in effect what Dr. Perry has written.

Second, in several instances in which the dentine seemed as sensitive as ever while wet with the solution, almost complete anesthesia was obtained by drying the cavity thoroughly. I have strong hope that when a reliable stronger solution can be obtained the remarkable variations in results will disappear; but we have much to learn about this wonderful drug. One phenomenon has occurred which it will be well to note,—after about two weeks a fungus growth appeared in my solution, which, as time passed, seemed to destroy the efficacy of the drug.

LOCAL HYPERESTHESIA OF THE GUMS.

BY J. SMITH DODGE, JR., M.D., D.D.S., NEW YORK, N. Y.

THREE cases of this trouble have come under my treatment within the last two years, with such variety of detail as makes the group very instructive; and the condition is so perplexing until its nature is recognized, and yet so easily relieved after diagnosis, that it seems worth while to put these cases on record.

I. Miss F., of middle age and general good health, having neglected her mouth and lost all her teeth by alveolar disease, had been wearing full rubber sets between one and two years. The dentures had been worn with comfort, except that lately the upper had become loose through absorption of the ridge. A new upper plate was therefore made of gold, of course fitting snugly everywhere. This had been worn two or three months, with some general complaint that the old set felt the easier if it would only stay up, when there gradually developed a tenderness of the right molar region, accompained by neuralgic pains about the temple and ear. The attacks were brought on by wearing the gold plate, and always passed away when the mouth was left empty or the rubber set was worn. There was not the slightest appearance of inflammation in the gum, nor any noticeable tenderness on pressure. Having never studied this condition, I felt sure there was some submucous disease, and explored again and again for any fistula which might lead to diseased bone or a fragment of tooth. Nothing in the least abnormal could be detected. After a number of weeks had passed without any change in the condition, as the patient lived out of town, it became necessary to bring the matter to some conclusion, and one day I painted the entire right upper molar region with tincture of iodine, showing the patient's sister how it was done and directing her to repeat the application several times at intervals of a few days. This was over a year ago, and the case has not been brought to me since. I recently heard from the sister that the trouble soon ceased after the iodine was applied, and the gold plate is now worn with comfort.

II. A physician asked me to see a patient of his who had trouble with his teeth. I found Mr. C., perhaps sixty-five, finely developed and with nearly all of a magnificent set of teeth. He was under treatment for diabetes, and had a good deal of neuralgia, which the physician had been successfully treating with codeine. But quite recently there had developed an excessive sensitiveness about the left lower molars, so that he could not chew hard food nor take either hot or cold drinks. He was disposed to connect the dental trouble with an earache, which came, he said, from some exposure to cold air; but the earache was irregular while the dental sensitiveness was constant. As I went to examine the mouth the patient begged me not to touch the gums about the left lower molars. The first bicuspid was wanting, the second bicuspid and three molars were absolutely perfect (except that one had a small crown filling), and stood so that the approximal surfaces could be perfectly examined. The appearance of the surrounding parts was equally good,—no tartar, no marked recession of gums, no pockets, no inflammation. The only symptom was an intense hyperesthesia of the mucous surface, intolerant of the lightest touch of the finger. There was absolutely no soreness of the teeth. No relief had come from codeine, and the condition was very distressing. I advised the doctor to paint the gum with the usual dental mixture of iodine and aconite. The result was an attack of furious pain, which the patient described to me afterwards in very emphatic language, but when this had passed away the original trouble was at an end. I believe a second application was made soon after, but eight or nine months later I was told that the patient had no more trouble with the teeth.

III. Mr. C., aged seventy-four, but in good health and active, had been wearing for several years an upper rubber plate having a partial lining of gold along the ridge. The fit was still good. Last summer he called to complain of a pain which seemed to originate in the right molar region, and which he attributed to a slight irregularity of shape in the plate at that point. As this corresponded with the surface of the mouth, and neither had changed in some years, I dismissed that cause and looked further. He described the pain as brought on by wearing the plate, but particularly by mastication, so that he said his jaw was sore. But pressure with the finger gave no pain, nor was there the least appearance of inflammation. I searched carefully at two sittings for any trace of dead bone or tooth, but nothing could be found. The pain was always relieved by going without the plate, and always produced by any attempt to eat with it. Besides the local "soreness," there was a feeling of distress about the maxillary articulation of the same side, with pain in the temple and ear. As soon as I was satisfied that this case was like the two preceding, I began the application of iodine and aconite, which gave no pain whatever. The patient's occupation did not permit him to come as often as I wished, but within the next fortnight I made three applications with gradually advancing relief. At somebody's suggestion he had also put alcohol fomentations on the cheek. About a month after the first call (having been absent the last fortnight) he told me the trouble was pretty much gone, adding that now he could "eat anything." This may be two months ago, and I have not seen him since.

Of course it does not explain these cases to give them a name, and I do not pretend to guess what the real center of disturbance may have been. But it is useful to know that a disorder so distressing, with symptoms which seem to prove some serious local lesion, is after all only functional, and can be relieved so easily and promptly as has been described.

APPARATUS FOR ROTATION OF THE TEETH.

BY J. N. FARRAR, M.D., D.D.S., NEW YORK CITY.

No. XXIII.

SINGLE-LOOP SEMI-ROTATOR.

SOMETIMES teeth not only erupt in the anterior or posterior position, but more or less rotated out of line. These cases may be divided into two classes: First, teeth that have but one side out of line, with the other comparatively in proper relation to it. (See Fig. 138.) The position may be understood as resembling a door swung partly open,—the hinge side remaining in nearly its proper position, while the other is more or less out. The second class includes those teeth with both sides rotated out of line.

It is my object first to take up the subject of the first class, and explain how they may be regulated, and then those of the second class.

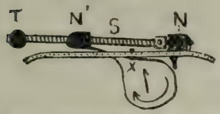
To construct a device that will operate well and be free from all annoyance is perhaps impossible, but by placing the more annoying portions of the device outside instead of inside of the arch, it may be worn with comparative comfort. This plan, of course, is more unsightly, but some patients prefer lingual comfort to personal appearance. Elastic rubber rings and threads in connection with a metallic band are practicable and much used, but besides being filthy and extremely disagreeable they are liable to slip off.

I make and use upon the screw-loop plan two kinds of rotators, which I denominate, first, the single-loop semi-rotator, because it lifts upon to rotate one side of the tooth only; second, the double-concentric-loop rotator, which acts upon to rotate both sides of a tooth. The method of constructing the first is illustrated by Fig. 137, but this in principle is only a modification of the "triplex screw-loop," illustrated by Figs. 135 and 136. This acts to rotate not only the one side of a tooth, but may also have a lifting action upon the entire tooth common to the action of the triplex of Figs. 135 and 136 combined if necessary.

Fig. 137, illustrating the device suitable for a case as outlined by Fig. 138, is shown in its component parts by Fig. 139.

Instead of both extremities of the loop band, B, being left free to act independently, as shown in Figs. 135 and 136, one end is stationarily fixed by solder or by a lug, X, at the point of or in the hole, O, made in the collar bar or plate, G, to which is also fixed nearly opposite the smooth nut, N, by solder, as shown in Figs. 137 and 139, or by a hinge joint as shown in Fig. 140. To the threaded nut, N′, which plays loose on the screw, S, is soldered the free extremity of the loop band (which when in action constitutes the only movable end of the loop), which when straightened causes the necessary draught upon the tooth within to rotate it, and in such a case as is illustrated by Fig. 138 it will produce the double movement of the tooth in the direction indicated by the two arrows, Fig. 137.

FIG. 137.



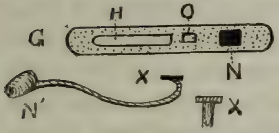


FIG. 139.

FIG. 138.

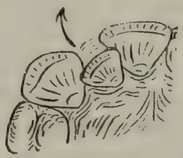
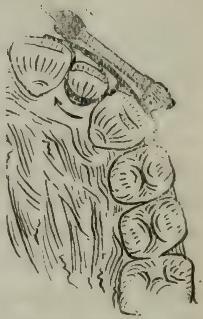


FIG. 140.



To prevent a back-sliding movement of the collar plate, G, along the surface of the teeth, a lug or projection is soldered on the wider surface of the collar plate, opposite to the nut, N, to project between the teeth, as shown in Figs. 137 and 140. To hold the entire apparatus in position, retainers similar to those shown in Fig. 136 may be used, but sometimes strings or even metallic bands, made independently or connected with the apparatus, will do.

The hole, H, in the collar plate, G, should be sufficiently long to allow entire freedom to the loop band, so that it will slide freely upon the (cuspid) tooth,—the object of the collar plate being simply for a bridge support to the opposite end of the loop band and nut, N.

In conclusion I will say, however, that while the first-mentioned device (Fig. 135) will always work highly satisfactorily, even in the hands of a tyro, this one will require greater skill, because the grip of the loop upon the tooth to be rotated may be insufficient to turn it unless the loop or band is first wound entirely around the tooth to prevent its slipping.

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PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

Regular monthly meeting, held Tuesday evening, October 7, 1884, in the rooms of the S. S. White Dental Manufacturing Co., corner of Broadway and Thirty-second street, New York.

President A. L. Northrop in the chair.

The meeting being called to order, Dr. W. H. Dwinelle made the following remarks:

Mr. President: I think you will justify me, thus early in the proceedings of the first meeting of our society this season, in calling your attention to the fact that the hand of the Destroyer has been busy with us since last we met. It becomes my painful duty again to announce that one of our most honored members was stricken down in the midst of his labors and usefulness without a moment's warning. I refer to our friend and brother member, Dr. O. A. Jarvis, who died on September 27, 1884. All of us will bear testimony to his uprightness, his truthfulness, his high sense of honor, and uncompromising integrity. Without desiring to take a leading position among us, he was a credit and an example to our profession in whatever he did. We shall miss him from our deliberations, and feel the loss of his counsel and wisdom. Dr. Jarvis was once president of this society; he was a member of various societies connected with our profession; was an occasional contributor to our journals, and has placed the profession under obligations to him for several ingenious and useful devices. Dr. Jarvis was eminently practical in all that he did, and was a most sincere and conscientious man. Perhaps in no way was this more manifest than in his religious character. Daily and hourly he lived the life of a practical Christian, and though death came upon him suddenly, it did not find him unprepared—he was ready. May we all leave behind us as pure and blameless a record. I am sure we will all unite in extending to his stricken and bereaved family expressions of our high appreciation of his many virtues, together with our deepest sympathy and condolence for their great and irreparable loss.

Dr. Frank Abbott. I move that the remarks of Dr. Dwinelle be adopted by this society as its sentiments in reference to the death of Dr. Jarvis; that they be spread upon the minutes, and that the secretary be instructed to prepare a copy of them, to be signed by our president and secretary and presented to the family of the deceased. I would also recommend, if it is deemed advisable, that the eulogy of Dr. Dwinelle be published in the journals.

Dr. Abbott's motion was carried.

Dr. C. F. W. Bödecker, chairman of the Clinic Committee, reported as follows:

Mr. President and Gentlemen: We had a large attendance at the clinic to-day. There were nearly one hundred present. Dr. Starr exhibited the Improved Electric Mouth-Lamp. Dr. J. H. Meyer presented a case of fracture of the inferior maxilla. The fracture occurred about seven weeks before the case came into the hands of Dr. Meyer, and it had to be broken anew and reset, which was done last Wednesday, and a splint applied. I myself demonstrated, upon an upper molar, out of the mouth, the new method of filling teeth with gold (Herbst method). After the filling was finished it was taken out by breaking the tooth, and many gentlemen had the opportunity of seeing that the edges were perfect. I then took the filling and hammered it quite flat, and the gold showed no tendency to come apart. The gold in this instance was used unannealed Not a piece was touched with the flame, and yet the several layers did not separate under the hammer.

INCIDENTS OF OFFICE PRACTICE.

Dr. John H. Meyer. In July last a lady was sent to me having a very large tumor on the left side of the superior maxilla. Upon examining the tumor I found it had two connections,—one over the root of the second bicuspid, the other surrounding the root of the same tooth. I advised the patient to have it removed, which was done by her physician, Dr. Schoonhover. He first divided the attachment over the root of the tooth. A great deal of hemorrhage followed, which was difficult to arrest, and as it grew rather dark the operation was deferred until the following day, when the other ligature was cut and the tumor removed. There was not so much hemorrhage at the final operation. The tumor was of a deep red color, and measured a little over two inches by one and a quarter, and three-quarters of an inch in thickness. It is of four years' growth, and first showed itself as an abscess over the root, which would disappear and reappear again. About a year ago the patient tried to pass a rubber ligature over the tumor in order to tie it off, but not succeeding, the ligature was left over the thickest part of the tumor, and the tissues grew over it to the thickness of half an inch. I have the tumor with me; also a model of the mouth. Three days after the removal of the tumor I extracted the roots of the first and second bicuspids, and looked for necrosed bone, but there was none. I saw the patient two or three weeks later, and the parts then seemed to be in a healthy condition. I examined it again yesterday, and there was no indication of a reappearance of the disease. I also had the tumor examined by Dr. Van Schaick, who pronounced it to be a condro-fibroma, showing cartilage cells in various stages of development, with a considerable amount of white fibrous tissue, and containing areas of calcified degeneration.

Dr. J. S. Latimer. I had a lady in my chair yesterday with a similar tumor to that described by Dr. Meyer, apparently arising from the alveolus of the left superior central. It had been growing six or seven months. I cut away a portion of it, not endeavoring to remove the entire tumor, and examined it microscopically. It showed multi-nucleated cells, and might be an osteo-sarcoma. I intend to submit it to Prof. Heitzmann, and get his opinion before operating further, as I want first to be certain as to what it is.

Dr. Frank Abbott. I want to speak of a little matter that may possibly be of some interest to you in connection with the treatment of abscess of the antrum. I have had considerable experience in that direction during the last four or five years, having had nearly all the time one or two cases on hand,—and not the same ones all the time, either. They come and go, and usually go away cured. I never had but one return. I have this summer had two cases, one of which had been treated a year, and the other a year and a half, I think, by different physicians in Memphis, Tenn. The patients stated that the trouble had existed for some five or six years, and had been treated for nasal catarrh before the abscesses were opened. In one case the opening into the antrum was at the upper edge of the alveolar process, in about the position the roots of the second molar formerly occupied; teeth had been removed for the purpose of facilitating access to the seat of the trouble. In the other case there were no teeth in the upper jaw at all, the patient wearing a plate. Attached to that plate was a tube nearly three-sixteenths of an inch in diameter, which ran up through the opening in the floor of the antrum and penetrated that cavity. It was placed there for the purpose of draining the antrum and keeping it open. It did keep it open; I thought it kept it open a little too much, if anything. The first thing I did was to take that tube away, and try to encourage the healing of the opening as quickly as possible. It is now very nearly closed up, and there is no discharge of pus at all.

I wish particularly to call your attention to an instrument which

I have recently invented for the purpose of treating these diseases. When the mucous membrane of the antrum becomes inflamed it is considerably hypertrophied, or thickened, and there are more or less folds in the membrane from the top down to the bottom. I imagine, without being able to determine the fact, that in these folds of the membrane resides more or less of the inflammatory condition which is the producing point of pus. In washing it out we have to depend upon a sort of irrigation of the antrum, because a syringe will not throw the injected liquid in every direction. In thinking over this difficulty during the summer, and how to overcome it, I got an idea from a gentleman who had been treating one of these cases, who had used a steam atomizer for introducing the antiseptic he wished to apply. He tried to use it in the case of one of these patients I have spoken of, but the steam was so hot it burned her, and he had to abandon the apparatus. Then I conceived the idea of throwing a spray into the antrum that would reach all parts of it, and be thrown with sufficient force to thoroughly wash the folds of the lining membrane. I procured a Burgess air-compressor, a simple machine by which with your foot you can pump into a condensing chamber a considerable quantity of air. It is about eight inches in diameter and fifteen inches high,—made of tin, I believe. I then discovered that there was a spray instrument with a flexible tube, manufactured in Germany, I judge, as it bears the name of a German house, but with no address. The part of the instrument I have devised consists of a long tube attached to the spray instrument with perhaps twenty small holes in it, by which a spray can be thrown in all directions. I pass it into the antrum, above the walls of the opening, then turn on the compressed air, which throws a spray with considerable force, for five minutes if desired, just where it is wanted.

President Northrop. What was the cause of the disease in these cases?

Dr. Abbott. In each case an abscess from a pulpless tooth.

President Northrop. Was there any necrosed bone?

Dr. Abbott. I did not discover any.

Dr. N. W. Kingsley. May I ask Dr. Abbott what reason he has for believing that the spray thrown by his instrument will pass between the folds of the mucous membrane, as he has described, with any more certainty than liquid ejected from a syringe with equal force?

Dr. Abbott. Of course it is a supposition; and the supposition is based upon the fact that with this instrument we get a force perhaps fifteen times greater than we do with a syringe.

Dr. Kingsley. I spoke with reference to a syringe used with the same force.

Dr. Abbott. With a syringe a foot long, and sufficient power behind it, you might do it. I have spray syringes for the same purpose, of different sizes,—one of rubber, and a smaller one of platinum.

Dr. F. A. Roy. A liquid thrown on a mucous membrane causes congestion or tumefaction, which prevents its entrance between the folds of the membrane, but an atomized spray does not have that effect, and physicians have found that a spray acts better in treating the nasal cavities.

Dr. Abbott. It is a fact, I am told, that when the substance known as Listerine—one part Listerine to two or three of water, I think—is applied with a spray instrument, with a powerful force of compressed air behind it, on the surface being examined with a powerful glass, little crystals of boracic acid are plainly seen. I have that statement directly from the manufacturer of Listerine himself. If this be true, and a sufficient force is used, an antiseptic of considerable power is applied to all the irregularities of such cavities as the antrum of Highmore at once, which in my judgment is desirable and very beneficial.

Dr. W. H. Atkinson. This is a very interesting point that has been alluded to by Dr. Roy. I am sorry he did not elaborate the text he started with, because his remark indicates that he understands the principles involved in these cases,—principles which have escaped the observation of most surgeons, and have only come to light through the investigations of dentists, who do not claim to be very superior differential diagnosticians. The fluid contained in the epithelial bodies of any mucous surface has a certain amount of salts held in solution in it, and it depends upon the affinity existing between this fluid and the fluid that you apply to the mucous surface of the cavity, whether there is an awakening of the hygrometric character of the epithelial bodies, and the membrane swells by taking in of the weaker solution. There may be an excessive amount of fluid taken into the epithelial bodies by virtue of the affinity subsisting between the salts held in solution in the fluid contained in these bodies and that which is presented to it. In the case of Listerine, our observations pretty nearly satisfy us that it would not be likely to cause harm to a mucous surface. I have asked you never to apply pure water to a mucous surface other than that of the stomach; never to introduce it into any air passages; and I have named now, to all of you who have followed my remarks, the reason for that. It should be saline. Always have it as nearly as may be equivalent to sea-water when you inject it into the antrum or any of the air passages.

I am impressed with the want of knowledge respecting these matters in the minds of those who have dealt with them, by the fact that such a description as we have heard could be at this day presented as coming from intelligent practitioners; that a drainage tube of the size named should be used anywhere in the human body, unless it be a case of a gunshot or comminuted wound; and that anyone should desire to keep up an abnormal discharge from a healthy mucous surface is also incomprehensible, and the practice quite untenable. Dr. Abbott was right in endeavoring to heal up the opening that had been occupied by the drainage tube; but I think he made a mistake in resorting to any treatment whatever. It is probable that the mucous membrane was sufficiently healthy to take care of itself, without further treatment than perhaps a little surgical operation, for the purpose of making a raw surface to facilitate the healing and closing up of the opening.

Dr. Abbott. It was discharging pus.

Dr. Atkinson. I judge that the pus came from the irritation caused by the tube that was there, and not from the other point.

Dr. Abbott. I guess you are right.

Dr. Atkinson. That treatment was just equivalent to keeping up an issue, as we used to do in fever sores, by putting beans or peas into these places to keep up a perpetual discharge, with the idea of thereby draining away some evil genius that was holding high court in the divine temple of the human body. We have gotten over that barbarism. The president asked a very shrewd question, viz., whether there was any evidence of diseased bone in the territory. The answer was negative. I don't know how much that was a part of the process of ratiocination through which I jumped at the conclusion that there was no disease in the mucous surface. Anyone who is at all acquainted with pathological manifestations and the laws that govern the reproduction of tissue would readily come to the conclusion that, from the statement of the case made, my judgment was sound. The doctor stated that the disease originated from pulpless teeth. If it originated from pulpless teeth, the irritation came not from the mucous membrane, but from the irritation caused by the dead pulp setting up a retrogressive process that we call inflammation. You are all familiar with the process of ratiocination through which I went to arrive at my conclusion; yet men have to get pretty gray before they are able to make an estimate of the soundness of such a jumped-at conclusion. It is that faculty that we are most lacking in. Dentists are as handicraft operators the highest class of men living, but in perception of the principles by which disease is brought about, how weak they are!

Now, if I have sufficiently warmed you up, let me give you a point in the management of that case described by Dr. Abbott, or any similar one. I would take a bit of sterilized sponge, of a size that would just fill the chambers without pressing upon the immediate walls so as to compress any of the corpuscles beyond giving a natural support; cut that sponge off smooth and even with the surface; then put the plate in, and trust to nature.

I have a case that is particularly in point here,—a case of abscess in the chin, arising from the devitalization of two teeth, that had persisted for four years. They were inferior incisors, a central and a lateral. The left central had been extracted; the left lateral had not; in a healthy subject. I think the original trouble occurred some ten years ago, in 1874. In the process of curing it the fistule was pressed open with pledgets of cotton, moistened with creasote and oil of cloves, for the purpose of enlarging the opening, and the bone was then burred away as far as the diseased territory was supposed to extend. Anyone who has made a few operations of that kind can easily tell when the instrument reaches healthy territory. I then washed out the cavity with warm salt water, and inserted a piece of sterilized sponge, saturated with a solution of bichloride of mercury, about one to five hundred, cutting it to a size that would as nearly as possible occupy the space of the lost tissue; just filling the chamber without pressing on the walls; for such pressure upon the walls would incite a retrograde metamorphosis that might induce an extension of the mischief. Not one drop of pus made its appearance in that case. The only exudate was a sort of elaborated serum, not offensive to the smell nor to the taste, and not in sufficient quantity to require any treatment further than touching the surface with a little bibulous paper two or three times a day. I received a letter from this patient a few days ago, rejoicing in the cavity being entirely healed, without a pit.

What becomes of the sponge in these cases I cannot tell. It does not all, nor one-tenth part of it, come away. What was removed in this case was black and rotten, apparently carbonized. After two or three days the discharge of serum ceased, and granulations of a healthy new growth came through the meshes of the sponge to the surface. Then I picked out several of these dark, coal-like, carbonized particles of sponge. That gives you a valuable suggestion. In every case where the inflammation has not proceeded beyond the stage of suppuration, after removing all the necrotic hard and soft tissues, simply wash out the cavity, insert your sponge-graft, and look for success.

Dr. S. C. G. Watkins. I have lately treated a case that may possibly be of some interest to the profession in this connection. A lady, forty-five years of age, of robust constitution, had the two right lower bicuspids filled thirteen years ago, without the pulp canals being cleaned out or filled. Since that operation the teeth had been abscessed most of the time, giving trouble off and on for the entire thirteen years. When the case came into my hands I removed the fillings, disinfected the roots, and filled them. In a few days the lady returned, complaining of the same trouble,—a dull, heavy pain,—a great deal of headache and neuralgic pain through the jaw and head. I then made a thorough examination of the surrounding parts, and found the alveolar process all dead,—both the inner and outer plates and between these bicuspids. I first touched the gum with carbolic acid to cauterize it and prevent pain; then cut through the gum, and with burs and chisels removed all the necrosed bone; the only live bone left around these two teeth being the anterior plate to the first bicuspid and that between the second bicuspid and the first molar. After removing the necrosed bone I syringed out the pocket with peroxide of hydrogen, and filled it with aromatic sulphuric acid, allowing it to remain about five minutes so as to allow the tissues to take up all they would. I then put some iodoform into the cavity, filled it with floss silk, and dismissed the patient for three days. At the end of that time I removed the floss silk, which had worked partly out of the cavity, syringed with peroxide of hydrogen, and found a little pus, which the peroxide of hydrogen very readily showed. I applied aromatic sulphuric acid as before; then filled with floss silk and a little powdered iodoform. In three days I again tested with peroxide of hydrogen for pus, and found none. At that time there was quite a deposit of new granulations, in the form of a white, albuminous-like substance, in the bottom of the cavity. The treatment I have described was repeated every three days for about three weeks, and each time the cavity held more and more of this albuminous-appearing substance, which was new granulations of bone; and at the end of three weeks it was so full that it entirely crowded out the floss silk. The lady was to return in three days after that, but failed to do so. I saw her three weeks afterwards, and she told me she had perfect peace, no pain whatever, and had not thought of me during the three weeks. The gum had healed nicely the teeth are now firm, new bone evidently having formed around them. The teeth were much discolored, and had the appearance of being quite dead.

Dr. Abbott. I think Dr. Watkins made one statement that is slightly inaccurate. He said that after using his burs, chisels, drills, and gouges, and applying peroxide of hydrogen, aromatic sulphuric acid, and iodoform, he sent the patient away; that after an interval he found in the bottom of the cavity a white, albuminous-like substance which he said consisted of the first granulations of bone-tissue. That is a thing that would hardly occur. That there was something filling up this cavity I do not doubt; that there were granulations there I do not doubt; but when he says they were bone granulations I have to take issue with him. In a cavity like that you would first get a formation of provisional cartilage, that must be converted into an embryonal condition in order to be formed into bone-tissue. I do not imagine that bone forms directly in any place where it has been taken away; it is not the case in fracture; it is not the case when bone is cut away, nor is it the case in necrosis. Nature always goes through the process of providing a provisional tissue in re-forming bone, that is converted into embryonal tissue, which in turn is converted into bone.

Dr. Atkinson. It is always well enough to correct errors when our corrections are correct. Our terminology is not always itself clear, and does not express what we think it does when we are speaking. I hold the small slip that has been magnified by the last speaker to be quite pardonable. Dr. Watkins said the deposit in the pocket was bone-tissue; Dr. Abbott that it was not. I can take either side of that question. It was probably bone-tissue in the sense of being a proto-vertebra, or bone-plate, being really an embryonic structure that is exactly identical with muscle-plate and nerve-plate. I take it there was bone-plate there that had come through the retrogressive metamorphosis spoken of by Dr. Abbott. But what is that metamorphosis? Who can tell us? That his deduction is sounder than the first speaker's deduction was, who has made the dissection to show us? There is an elementary condition known as embryonic mass, and I am of the opinion that a retrogressive metamorphosis occurs there which reduces it to protoplasm, from which the various tissues arise. The cartilaginous stage does not occur when we have reproduction of bone upon a site that has already well formed bone. There is that difference between reproduction and the original production. In the fetus the dense bone always arises from the provisional cartilage spoken of; but we have true bone that comes directly from the proto-vertebra without the intervention of cartilage.

Dr. Wheeler, of Albany. I have a case in my practice that I may mention as showing the aptitude of nature to help herself when we give her a chance. It was a case of an abscessed central incisor that would not yield to treatment by the usual method. The end of the root was amputated, and the process surrounding the root was cut away largely. That shortened up the tooth, which was afterwards drawn down into place and held there. The root was filled. There has been a new formation of bone,—that I know; a perfect cure has been effected, and the tooth is doing as good service as any other in the mouth. The wife of the same gentleman has a tooth that was treated in the same way, except that there was no shortening up in her case. I speak of this case to show how beautifully nature will help herself when she has an opportunity.

Dr. Watkins. A lady came into my office the other day suffering very much from neuralgic pains in the face and head. She said that about an hour previous to coming to me there was an explosion in her jaw, which she located in the left superior second molar. She said the explosion was similar to the report of a pistol; that it was heard through the room, and she was much frightened. She also informed me that some years ago a similar explosion occurred in her mouth. In the tooth she indicated I found a congested nerve. The tooth did not seem to be split. I had considerable difficulty in relieving the pain, which subsided in about three hours. I then applied arsenic to kill the nerve. The nerve canals have not yet been treated. There has been no further pain.

Another case I had during the summer was a right superior cuspid, with no appearance of a cavity observable from a casual glance; but, by wiping the tooth thoroughly dry on the approximal surface, I discovered what I thought to be a small cavity. Upon wedging the teeth apart and exploring this cavity, I found it penetrated to the nerve canal, there being but a very small opening. I worked around carefully, and not seeming to cause any pain I began to get more bold, and finally went into the canal, still causing no pain. I explored the canal, and found no sign of any nerve, either in a state of decomposition or alive. It had the appearance of never having had a nerve. The tooth was not discolored a particle. I filled the root, and that is the last I have heard of it. I would like to hear some explanation of that.

Dr. Roy. I once had a patient, a gentlemen seventy-five years of age, in whose mouth I found a pulpless tooth similar to that spoken of by Dr. Watkins. The pulp-chamber was open; there was no vestige of nerve, and the tissues at the end of the root seemed to have naturally healed—scar or cicatrix formed there. I filled it at once, and there has been no trouble since.

Dr. Atkinson. It is not long since the reports made of teeth that were supposed to have burst from an accumulation of gas were laughed down and treated as Munchausenism. Now we have another case. I have reported four such cases before—I don't know what—societies in this city, that came under my observation and within the immediate range of my own family connections. I have a sister-in-law visiting me now in whose mouth just such a phenomenon took place as has been described by Dr. Watkins, with the exception of the tooth being split and the pain ceasing immediately. A similar thing occurred also to my father, the tooth in his case being a superior bicuspid. What are we to learn from this? It is a confirmation of the doctrine that disease is an effort on the part of the elements of the tissues to return to their embryonal condition. It is a disruption of the molecules of the body that sets free some of their elements in a gaseous condition, precisely as fireworks do. That these changes do take place in the mouth we have abundant proof.

The carefulness with which the doctor reports his having examined and explored another tooth is commendable, but how the atrophy of the pulp occurred is not clearly before our minds. In the case described by Dr. Roy there was undoubtedly a retrogressive metamorphosis, and nature seems to have taken advantage of the retrogression and sealed the end of the root, encysting it so that it tolerated contact. If we were sure that the ends of the roots of pulpless teeth were sealed up, we need not hesitate about filling them at the first sitting. The only danger lies in filling teeth whose roots have patulous mouths, that probably open into a latent abscess. Thousands of persons are undoubtedly carrying such abscesses in their mouths to-day, and not knowing it. How many persons have gum-boils, as they call them, that periodically burst and heal up and reappear! They are nothing but latent abscesses on the roots of teeth. In good constitutions nature takes care of the details. I had a case that followed that course for twenty-four years, and in just four weeks from the time I took it in hand it was completely healed. It was in the mouth of Prof. Dickerman, of Taunton, Mass.

Dr. S. C. Spooner. A gentleman came into my office and said, "I have an ulcerated tooth, and they say you can cure and save it. Is that so?" I said yes, I thought so. "I must have relief at once; I am suffering terribly; my wife has been up two nights, and she says she can't stand it another night." I examined the tooth and found a very fine-looking gold filling in a second superior bicuspid on the right side. He asked, "What are you going to do?" I told him I should have to use a little radical treatment. I put a sharp lancet up into the gum; pus bursted out as I withdrew the lancet, and the gentleman said he was relieved at once,—the pressure was gone. He came in once a day for three days, and I kept the gum open with a lancet, so that the pus could all run out. At the end of three days it began to heal. I removed the filling, cleaned out the cavity, treated and refilled it. It is five years since the operation; the gentleman has the tooth in his head now, and it is a good and useful organ, saved by the simple process of lancing.

President Northrop. How did you treat the tooth?

Dr. Spooner. I put in chloride or phosphate of zinc for two or three days, and then injected simple alcohol.

Dr. J. W. Clowes. I am delighted to see such evidence of progress. Only a little while ago Dr. Spooner stated that an ulcerated tooth could not be cured,—that there was no use in trying to cure such a thing as that. He now proves that ulcerated teeth can be saved. He says he opened the abscess with a lancet, and that it discharged freely and healed up, and then after that he took out the dead nerve and treated it inside.

President Northrop. He did not say he took out the dead nerve, but that he treated it.

Dr. Clowes. Well, I suppose he did that. The healing up of an abscess while the dead nerve still remains in the tooth is an utter impossibility. You must remove the dead nerve first, and then disinfect the interior of the tooth. When that is done almost any abscess will heal up and the tooth can be saved. There is nothing more certain in the world than that. Another thing I want to have understood. Latent abscesses have been spoken of. They do exist, and are very common. They are the result of the presence of dead nerves in the teeth. They do not remain in the same condition; they are growing; they may not be felt or give any trouble, yet they are growing all the time. Wherever a dead nerve is present in a tooth you can safely tell your patient there is an abscess there, and the sooner that dead nerve is removed the better it will be. Do not leave it to break out at some future day and create destruction, but be merciful and just, and remove it at once. I was reading some time ago of a dentist in a neighboring State who had a good deal of trouble, or at least his patient did, suffering great agony from such an abscess. It was such an agonizing thing that he came to New York to consult a brother dentist in the matter, and all this pain was endured by the unfortunate patient for some two or three days. If the dentist had just put a lance into that abscess, or, if the abscess had not come through the bone, drilled through and let the poison discharge itself, the lady need not have suffered for two or three days that great pain. Have a steady hand, give your patient a stout heart, and go fearlessly right to the seat of the trouble. Don't be afraid. It is one of the most beneficent and humane operations that a dentist can perform.

Dr. J. F. P. Hodson. I have a little incident to report as a sort of plea for thoroughness of diagnosis. I was called a few days ago by a physician to see a lady whom he was treating, and who had developed acute pericementitis in a left superior bicuspid. I treated it in the usual way, by drilling through the alveolus, and it was relieved before I left the house. That was in the afternoon. The next morning I received a telegram to the effect that the patient was in a worse condition than ever. I was a good deal disturbed and mystified, because I was quite certain that I had touched the end of the root and aborted the abscess. I immediately visited the patient, and found that instead of one dead tooth she had two. I had been satisfied to find one and relieved it; but the trouble had passed to the other contiguous tooth, and during the night the tissues had swollen to such an extent that I was not able to use a drill; I had to apply poultices. During the afternoon, the patient being under the influence of chloroform, I lanced the abscess. It was an entirely new one that had formed on the root of the approximating tooth. When I treated the first one I had not the slightest suspicion that there were two dead teeth there. I looked for one, found all I could ask for as a cause for the condition, and relieved it. During the night transference of the congestion to the other equally offending tooth occurred, from which the patient had a worse trouble than from the first, in consequence of their disinclination to call me in the night.

Adjourned.

B. C. Nash, D.D.S., *Secretary.*

Special meeting, Friday evening, October 10, 1884. President A. L. Northrop in the chair.

President Northrop. Gentlemen, this being a special meeting, and as we have no business before us except the paper for the evening, I now have the pleasure of introducing Professor Charles Mayr, of Springfield, Mass., who will address you on the subject of

The Odors we Inhale.

Prof. Mayr. Gentlemen, having been invited to speak before you, I shall try to call your attention to a subject which appears to me to be too rarely treated by essayists. I presume it is because the subject is fraught with very many difficulties, and requires a good deal of investigation,—not for a week only in advance of the paper, but extended investigation,—in order to present anything worth listening to. The observations have to be gathered during a lifetime. I feel encouraged to hope that I may be able to give you something that, you will agree with me, is quite important to your profession.

We are all familiar, from our school days, with the doctrine that human experience is conveyed to our brains by five senses,—viz., sight, hearing, smell, touch, and taste. I think it is now pretty well acknowledged that those five senses are nothing but a modification of one single sense,—that of touch,—modified by a peculiar receiving apparatus and nerve connections, which convey in a different manner the different sensations to our brain. These five senses are arranged according to a very scientific physical plan. The sense of touch may be described as a mechanical contrivance for conveying impressions of mechanical facts to the brain. The transmission of the sensation certainly is mechanical. Electricity may accompany it, but the slow rate of speed of nerve-transmission proves that it is not the essential factor. To perceive in a specific manner chemistry, or the "science of liquids," we have the sense of taste. The perception of solids, or the science of physics, is taught by the sense of touch; and there is a sense for perceiving gases, or aeriform substances,—viz., the sense of smell. It is only substances which give off vapors that we can smell.

I have here several specimens. If you look at these bottles you will not feel shocked at all; but if you put your nose to them, I have to apologize! Here is a bottle from which, as I may observe on applying my nose to the outside, no odor arises; but when we open it and allow the vapor to reach the nostrils, we find it is one of the worst-smelling substances that the chemist is able to produce. I shall not do it without provocation. Only when the vapor reaches our nose do we smell.

What is an odor? An odor is a far more complicated something than most people would think. Some people have the idea that the odor of a substance can be separated from that substance; that we may have the substance on one side and the odor on the other. This is just as impossible, in an objective way of viewing things, as it is to separate the aspect of a substance from the thing itself. The odor of a substance is nothing but the substance itself and the impression of it upon our nerves of smell. Without contact of the substance with the organs of smell we can have no objective odor. An odor is to the sense of smell what a view is to the sense of sight. To have a real, not mental, view of anything, a series of conditions is necessary. First, we must have an object; second, the sending off from this object of certain wave motions,—the explanation of light; third, the transmission of those waves to our eyes; fourth, the complicated and intricate structure of the eye; fifth, a proper nerve connection between the eye and the brain; and, sixth, a proper condition of the peculiar apparatus which produces the consciousness of the sensation in the brain. Any of these requirements lacking, no sight takes place and no view is obtained. It is similar with odors, but somewhat simpler. In order to have the sensation of an odor it is ncessary, first, to have a substance in the form of vapor; second, contact of that vapor with the olfactory organs; third, the proper condition of these organs; fourth, the properly working apparatus for transmitting the sensation; fifth, the normal apparatus of consciousness in the brain. We may omit for a moment the last two requirements,—viz., the proper condition of the olfactory nerve (transmitting clerk) and the receiving clerk of the brain apparatus, and examine the somewhat more superficial and simple conditions before that stage is reached. While in the popular mind an odor is some peculiar thing having a distinct and separate existence, and thereby becomes a kind of angel or devil, if we look at the phenomenon in a proper and scientific light,—that is, that it is the action of a substance upon our olfactory nerves,—it becomes much clearer. Sulphureted hydrogen becomes odorless; all the trouble with it lies in our nose; odor becomes as subjective a word as pain, joy, or pleasure. The terms "bad odor" and "good odor" become matters of sensuality, just as "epicurean," "good wine," "bad wine," and like expressions do, as far as their impression upon our senses goes. Every sensation, whether pleasant or unpleasant, ought to fulfill a mission. If there is no such purpose in a pleasurable sensation, it usually becomes what we term *sensual*, and, as the term implies, of low grade.

You are all familiar with sulphuric acid, or oil of vitriol. I have some here, and it is without the slightest odor. The reason of that is that it gives off no vapor whatever. Some experiments have been made with this substance. A certain quantity of sulphuric acid was put into a jar from which the air was exhausted, and a solution of barium hydrate, which has a strong affinity for sulphuric acid, was put into the same jar, and after five years there was not the slightest evidence of any evaporation of the sulphuric acid shown by the formation of the characteristic sulphate of baryta. Sulphuric acid gives not the slightest trace of odor. If we warm the acid, we will perceive a sensation, but it is only irritating; it is not a distinct odor. There is no odor by which you can distinguish sulphuric acid from hydrochloric acid. This is what led Magendie, the celebrated French investigator, to suppose that there existed no specific sense of smell at all. He experimented upon animals. He removed from a frog the olfactory bulbs, which give and convey the sensation of smell, and then put ammonia to the frog's nose. The frog lifted up its foot and wiped off the ammonia; and Magendie concluded that the frog still smelled the ammonia. But this conclusion was afterwards proved to be fallacious. If you take a frog and put ammonia to its anus, it will wipe off the ammonia from there just the same as from its nose; and we cannot very well suppose that a frog has olfactory nerves in its anus. That experiment proves that Magendie was wrong. The fact is that the ammonia simply acts as an irritant upon the mucous membrane; if ammonia is applied to any mucous membrane, it will cause irritation. Acid, as such, has no odor. It has simply the effect of irritation. Odor is due to quite a different thing.

As to the anatomy of the organ of smell, I need say but little. You are familiar with the olfactory bulbs and the origin of the olfactory nerves. They originate in three different parts. I heard an excellent lecture at the Saratoga meeting, in which it was stated that the lower branch of the fifth nerve also showed the same segmentation into three parts; and there seems to be a principle involved that we have not yet comprehended. The olfactory nerve consists of three distinct parts. These are distributed over the mucous membrane of the nose, called the Schneiderian membrane. In Europe that term is used to designate the upper part only, but in this country it is applied to the whole lining membrane of the nose. At the uppermost end of that membrane are what are called the olfactory bulbs, consisting of small ganglia, ramifying into fine nerves.

Some of you have read the very interesting work of Dr. Jaeger on the subject of "Odors." His ideas may at first appear eccentric, ridiculous, or preposterous, but a careful and unbiased perusal of the book will show him to be a deep observer. You know how large the olfactory bulbs are in the human subject. Dr. Jaeger says they are out of all proportion to the uses we make of them. Is that arrangement with a purpose or without? Do we need such powerful bulbs to tell us if our steak is stale, or the cheese old, or that things in general are offensive? Dr. Jaeger's investigations would lead us to believe that the organ of odor performs far more important functions than we dream of. He makes the pun that one animal fears another by instinct because it stinks. He says that one purpose of the olfactory organs is to distinguish the character of persons by their peculiar odor; that both animals and human beings are able to tell instinctively by the sense of smell whether another animal or another human being is friendly, or hostile and uncongenial to them. Suppose this to be true, and that our friends could smell our wickedness! Instinctive knowledge of the wickedness of others would teach us, more than anything else, to walk straight and not to commit any deed that would smell to heaven. This theory appears absurd, but there is a grain of truth in it. You have all noticed in your anatomical studies the relatively large size of the olfactory nerves, as compared with the relatively small importance we attach to the sense of smell.

After this philosophical digression, we will examine the more material factors entering into the sensation of smelling. First, as I said, we need a vapor. No substance smells which is not volatile. The organ of smell is far more sensitive to organic vapors than it is to inorganic vapors. The inorganic acids smell very nearly alike. Hydrochloric, phosphoric, and sulphuric acids, etc., when heated, have nearly the same odor,—not distinct at all, but simply irritating to the nose, which sends a telegram of distress from the irritation.

There are varieties of vapors and odors, as acid odors, alkaline odors, ethereal odors, pungent odors, nauseating odors, aromatic odors, empyreumatic odors, animal odors, odors of putrefying substances, odors of fermenting substances, etc. According to the sensualist, there are only two kinds, pleasant and unpleasant odors. There is a deeper philosophy than that behind all odors. In nature every odor has a purpose, which is either to induce us to get more of that odor or to keep away from it; and every odor is useful. The odor of certain animals is useful; not to us, perhaps, but to the animal. We have heard and laughed at thousands of skunk stories, all of which show that the odor of the skunk is useful to him in keeping his enemies away. Meat in the frying pan has a very pleasant and attractive odor for the hungry; and meat under some other conditions has an offensive odor, the purpose of which is to warn us that the meat is no longer wholesome food. Some plants have very offensive odors. In my opinion the purpose of that in every case is to warn us, either in their interest or ours, against using those plants. On the other hand, a pleasant odor, to a certain degree, is always an inducement to appropriate in some way the things that send forth those pleasant odors. There are many persons who, from congenital defects, cannot smell anything. What numbers of mistakes such persons make! We can see plainly that without the sense of smell a person might become unpleasantly unclean. I have observed that in a certain person who is deficient in the sense of smell the upper part of the nose, which is the seat of that sense, is poorly developed; the nose sinks in. That gentleman will approach the most atrociously smelling substance without the least discomfort or objection; he will smell ammonia and feel an irritation, but cannot tell whether it is ammonia or sulphureted hydrogen. You gentlemen, who work in the mouth, have occasionally noticed odors more or less powerful coming out of the mouth. In nearly all papers upon the subject these odors are described as sulphureted hydrogen or sulphide of ammonia. I have here samples of those substances, and if you have met with them in the mouths of your patients I wish you would tell me of it. But I presume you have not. To my mind they are not the offensive odors we meet in the mouth. The offensive odors are all certain organic acid odors, together with the odors of ammonia salts of these acids. Most of you are familiar with the fact that under certain conditions the human system gives off odors which are highly unpleasant. These odors can be produced artificially. We take some meat, put it in a silver crucible, and heat it with a little caustic potash,—not heating it too high,—and when it is poured off you obtain a white mass that is completely odorless. These substances are odorless as long as they are alkaline. Here is bread, and here is meat, treated in this manner. Suppose I should put those into a tumbler and pour a little water and acid over them; immediately every one of you would recognize the odors produced as those of an unclean dog, or of a man who has lived on a meat diet, or of a man whose diet was mostly cabbage, etc. All these odors you will also find in the mouth. They are produced by putrefaction; and that putrefaction is the cause of the imperfect oxidation of meat, bread, etc. If you take meat and sugar and oxidize them perfectly, you get nothing but carbonic acid, nitrogen, and water; but if the oxidation is imperfect, you get certain organic acids, such as butyric, caprylic, valerianic, and other acids. In their pure state they have a purely acid, slightly irritating, not unpleasant and characteristic odor; but if you combine these free acids with a trace of ammonia, you have those unpleasant odors, like that of sweat, which is butyric and caprylic acid, with a little ammonia salts of both; therefore those odors are not odors of ammonia, but odors which belong to the butyric and other fatty acids, if these acids are set free in the process described.

Whether an odor is pleasant or otherwise depends entirely upon ourselves. I have here a pure solution of sulphureted hydrogen in water. When you first smell it you get the impression that it is offensive and harmful, but if you smell it again you find it is not. I rather like it. Here is another substance that is much spoken of as producing odors in the mouth, i. e., the sulphide of ammonia. If you smell that you will say you have never noticed that kind of an odor in the mouth. Those odors are to the chemist of great importance in distinguishing substances. You have read in organic chemistry of ethers, alcohols, amines, etc. They all have a characteristic odor, and many times the most important.

All that a hand-book on organic chemistry says about a substance may be comprised in the formula: Colorless liquid, of — specific gravity, ethereal odor.

All of you have to use alcohol. Commercial alcohol is a mixture of a great number of alcohols, as ethyl, butyl, propyl, amyl alcohol, etc. I have here a sample of chemically pure alcohol; not that commercially so called, for I made it myself. It has been distilled very often, and you will be astonished to discover how little odor it has; you would think it was water. One of the first products of a careful distillation was this absolute alcohol. After the distillation had gone on to a certain point there was obtained another kind of alcohol, called butyl alcohol; that is, the alcohol with the radical of butyric acid. There is no unpleasant odor about it yet, but it smells very strong; it belongs to what is called the fusel-oil series. Going further, we got a third distillate called amyl alcohol, and that has an unpleasant odor. The last product was what is usually called fusel oil. If you study the use of alcohol for medicinal purposes you will find the following interesting and useful facts: The human system is built up of ethyl compounds. The products in the liver are all ethyl derivatives. Strange to say, butyl and amyl alcohol act as real poison, while ethyl alcohol can be transformed, burnt up, and utilized in the system. The heavy, lasting consequences of drunkenness by poor brandies and whiskies are due in a great measure to these fusel oils; so it is important to be able to tell an alcohol that contains butyl and amyl alcohol. Beer and wine contain scarcely any. Pure alcohol has almost no odor whatever. That which has an odor has more or less butyl and amyl alcohol in it. If you are able to distinguish by the odor of an alcohol whether it is pure, you have a very easy test of a very important matter.

Offensive odors we generally wish to destroy, and the question arises, how shall we destroy them? All odors disappear immediately upon the application of proper disinfectants; yet they do not disappear when you apply antiseptics only. You can have the odor of carbolic acid and the odor of decaying meat without the two interfering with each other in the least. But when you introduce a disinfectant the odor is gone. That fact shows you the difference between a disinfectant and an antiseptic. A disinfectant destroys injurious products; an antiseptic prevents their formation. The unpleasant odors of substances warn us against them. You have all been many times warned by the offensive odor of unwholsome food; but the way in which that warning is conveyed is not so clear. How have we acquired the possibility of being warned by a bad odor? I think it is an acquired talent. Suppose several persons eat the same kind of meat; in some the sense of odor is more highly developed than in others; they notice that the meat is tainted, and the others do not; the result is that those who eat but little of the tainted meat are less likely to be made sick. In Switzerland, on an occasion where the people ate diseased veal, all those who ate a certain quantity got what was called typhoid fever, but which was a disease similar to the anthrax or splenic fever, and many died. The disease was investigated by several scientists, and was found to depend upon a germ. If one has an acute sense of smell he will not eat tainted meat, while persons in whom the sense of smell is dull or wanting will eat it and will suffer.

Why are certain odors pleasant? Is it merely for the creation of a pleasurable sensation? I do not think so. Those things which appear pleasant to us attract us; they recommend themselves to us in that way, in order that we may do something with them. The odor of the violet is pleasant to us. Why that is so involves a very nice question. Has the volatile oil of the violet an antiseptic action upon the nasal organs? Not that we know. What is the odor of the violet? It is nothing but a vapor of an aromatic oil which the violet produces. Why does the violet distil an aromatic oil? Is it in order that the butterfly and certain kinds of bees that are useful to the violet may be attracted? Not that we know. But the sensuality of man likes the violet; therefore the violet is cultivated, and by means of its odor it protects itself. We are the servants of the violet, not the violet our servant. The violet uses us for its purposes. By its pleasant perfume we are induced to propagate it, and in that way it tricks us. We have read the interesting essay of Darwin on "Orchids." Among the orchids is one which fools the insects by its odor. It spreads a most delightful perfume, which attracts insects in great numbers, but furnishes no honey. When the insect goes away disappointed, it carries the pollen of the flower with it to the next flower, which is thereby fructified, and in this way the odor of the orchid serves a useful purpose,—a very beautiful arrangement.

Some persons have bad odors in their mouths, and the important question arises, why do not people smell their own odors? We find cases of bronchitis with big cavities in the bronchi which have an offensive odor, yet the persons themselves are not annoyed by it at all. In my opinion this is simply an acquired arrangement in their brain-center, by which they are enabled to survive. If they could smell their own bronchial secretions, they would kill themselves! The practical point is, how can you remove those odors? For that purpose we have to determine the seat of the odors. If it is in the mouth, the application of permanganate of potash will correct the trouble. I have not found any odor to resist this substance. I have made the most horrible smelling substances, and entirely removed the odor by the application of this agent. People have chronic coryza, or "cold in the head," which prevents them from smelling their own odors, which are so offensive that they are hardly bearable. When the seat of the disease is in the nose there is nothing to be done, in my opinion, except to cure the condition.

You will find in many cases patients with chronic catarrh, with the roof of the mouth dry and covered with a brown crust. In those cases there is a very offensive and penetrating odor emitted from those brown crusts. It has been found that carbolic acid treatment is very effective in such cases. With regard to odors from the lungs,—it is strange, but consumption has no odor; but bronchitis, or disease of the bronchi, is always accompanied by penetrating odors. The sputa thrown up from bronchial catarrh will drive almost anybody out of the room. This odor may be obtained by treating meat with caustic potash. It is produced by an imperfect oxidation of the albumen of the bronchi. In those cases we are powerless. No remedy has been found which will reach beyond the first ramification of the bronchi.

In some cases odors come from the stomach. If they are persistent, we have to look for a serious affection of that organ. It is possible that odors of the stomach may come from a slight affection, but in most cases the cause is cancer. Cancers produce most offensive odors. If the odor is in the mouth, the best remedy, as said before, is permanganate of potash.

Dr. Hodson. How many grains of the permanganate of potash to half a glass of water would you recommend to a patient for rinsing the mouth?

Dr. Mayr. I should say about five grains to four ounces of water. It depends upon the rapidity with which you desire it to act. It is a powerful substance, and we have to be careful in using it. Some dentists, in my opinion, use it in a too concentrated form. If I should put into those glasses on the table, which contain bad-smelling substances, a few drops of a solution of the permanganate of potash, the odor would be gone. Whether the odor upon which it acts is a pleasant or an unpleasant one, makes no difference. It acts upon all odors alike. It is what we call a caustic. A caustic is an agent which destroys or dissolves other substances completely. A substance which acts only upon certain parts is, in my opinion, a different thing; as a rule it is a stimulant. We sometimes call it a poison, sometimes a tonic, etc. A caustic is an agent used in such an amount as to remove without great distinction every tissue. So, if you use a strong solution of permanganate of potash, it destroys all the tissues. If you use it in proper strength it becomes a disinfectant, and destroys odors only. Five grains to four ounces of water is about the maximum I would use.

Dr. Hodson. I have used permanganate of potash to a considerable extent. It has done its work as a disinfectant, but in cases of regulating teeth, where plates have been in the mouth for days without change, when the plates were removed there was a collection of food about the teeth, and the deposits were so concentrated that I would have to go through the whole mouth and give all the teeth a regular cleaning. Probably I used it in too great strength. I have a case in mind of a dentist who had a very disagreeable breath. Unquestionably it was not from cancer of the stomach, because the individual finally recovered perfect health in another country, and came back with a good, sweet breath. It could not have come from his lungs, because he had no lung affection; and it could not have come from the bronchial tubes, because he had no bronchial disease. It did not come from his teeth, for they were pure and clean. A sweet breath is a matter of much importance to every one of us. It is a question of dollars and cents with a dentist. If he has an offensive breath, no matter how great his professional abilities may be, his patients will become disgusted.

Prof. Mayr. In those cases I have usually found that an investigation of the pharynx yields most satisfactory results. In almost all these cases the odor comes from chronic catarrh of the pharynx, frequently induced by smoking. My attention has been drawn to many such cases. It is more common in Germany than in this country. In those cases the application of a solution of carbolic acid, or cresylic acid, proves efficacious; but it would be far better still to abstain from smoking. If these people stop smoking for a day, their breath will be far less offensive the next day than it was the day previous. The best remedy I have found is weak carbolic acid. In cases of exhalation from the stomach, there being no cancer, what is known as carbolic-acid pills have been found by Niemeyer to be beneficial. Of course the carbolic acid must be used in small quantity, for it is a powerful substance, and effects the kidneys. If the odor comes from the nose, I pity the patient, because these cases are the most obstinate of all; very few have been effectually cured. There is another substance, hydrogen peroxide, which has a good effect in these cases; but it has the objection of being somewhat too powerful. I have not had much experience in its use.

Dr. Hodson. The gentleman to whom I alluded did not smoke at all. His digestion was very much impaired, and his offensive breath was doubtless in some way connected with the imperfect digestion and assimilation of food in the stomach. On the other hand, I smoke like a sinner, after dinner, every night, and there is not one out of a hundred, perhaps, of my patients who knows that I smoke at all. They are surprised to find that I smoke; but my digestion is good, and all the operations of my system are properly performed.

Dr. F. Y. Clark. The odors of the mouth and how to manage them constitutes, in my opinion, an important question for our profession. I have used permanganate of potash, salicylic acid, carbolic acid, and bromo-chloralum, at different times, for the removal of odors, and I find that bromo-chloralum will answer the purpose better than anything else, perhaps, in the majority of these cases. It is better than carbolic acid, for there are certain cases where carbolic acid will not do. Either bromo-chloralum or salicylic acid is frequently of great service. To ascertain whether the odor comes from the stomach or the teeth, simply close the mouth and breathe through the nose; then close the nose and breathe through the mouth. This will indicate the seat of the trouble. I have in two or three cases used a nasal douche with benefit. It is a matter we dentists have to be extremely careful about, and I am on my guard every day. I have used disinfectants in my own mouth, and I think the majority of us would do well to do the same. We should take counsel of our wives or daughters, or somebody who will tell us the condition of our breath,—for unfortunately, or fortunately perhaps, we cannot tell ourselves.

Dr. W. H. Atkinson. With reference to the permanganate of potash, if in using that remedy it occasions much discoloration of the teeth, take a saturated solution of oxalic acid, one part to five of water, and direct the patient to rinse the mouth with it,—and presto, change!—all the offence is gone. The only objection I have to using it strong is the fear that the patient would swallow it. In the strength I have named, if the patient does swallow it, he does not get more than five grains. I give this practical point to those who may desire to utilize a very valuable agent. I want to ask Prof. Mayr if he can tell us just at what point a substance that is pleasant becomes deleterious, and that which is unpleasant salutary?

Prof. Mayr. When something pleasant is put to our nose we presume the thing brings good to us. But it is not by what seems good or bad to the individual that we must decide this question. What we call good as an individual is bad if it is divested of good for the race or type; therefore, if there is an odor which is pleasant to us, we have to inquire whether that substance promotes the wellfare of the family, the tribe, or the race. The only way we can judge if a thing that is pleasant is good is to weigh the effect it will have upon the race. If we take that into consideration, we can see that the most unpleasant thing may be good.

Dr. S. G. Perry. Prof. Mayr has not mentioned one cause of unpleasant odors in the mouth, that of germs of putrefaction. Do you consider them a cause of unpleasant odors?

Dr. Mayr. To undertake to answer that question would lead into an investigation of the chemical process by which the offensive odors in the mouth are produced. In my opinion, they are produced in most cases by those germs. If you let yeast stand for a short time, you get the pleasant odor of fermentation. After it has stood a while longer, that odor passes away and the yeast begins to smell unpleasantly. This odor is produced by other germs than the first; it is a combination of acid with a slight trace of ammonia. Most of those odors belong to the acid series, to which butyric acid, caprylic acid, valerianic acid, etc., belong. They are produced in the mouth by the action of low organisms, and those organisms are nourished in the mouth by those acids. They are acids combined with ammonia. Those odors are also produced in the bowels of some persons, but in another way. With meat and bread and caustic potash I can produce exactly the same odors. In the mouth I believe they are produced by low organisms. In the bowels the production of those odors is one of necessity; it cannot be helped. In many cases the secretions of the bowels produce a peculiar fermentation, during which those odors are generated. The gases in the bowels are almost always hydrogen and carbonic acid gases. Some claim to have discovered sulphureted hydrogen. These gases carry along the odors of those same acids I produced for you to-night. In the bowels they are produced in quite another manner than they are produced in the mouth; they are of a nervous origin.

Dr. J. L. Williams. According to Prof. Mayr's understanding of the sensation of these odors, is it due to a mode of motion of the molecules that these aromatic substances give off; and, if so, how does he explain the fact that many of these aromatic substances—as musk, for instance—may remain exposed to the air in a room for ten years, giving off odors all the time, without any perceptible diminution in their weight?

Dr. Mayr. With regard to musk, the molecules are so small that although there may be millions of them set free in the air, their loss would hardly be appreciable. Some experiments have been made for determining the size of molecules. Take the envelope of a soap bubble and hold it in a certain light, and you see beautiful colors. These colors are produced by little waves in the substance of the soap. By this means it has been ascertained that one wave of light is about one forty-thousandth of an inch in length. Blow a large soap bubble and you find it assumes colors, but in the center of that bubble you will observe a spot, a dark circle that shows no light. On the supposition that there is in that bubble one layer of molecules, a single molecule is reduced to less than one hundred-thousandth of an inch. By computation upon this basis, it has been made probable that there would be at least 1,000,000,000,000,000 molecules in one cubic inch. Other calculations make it probable that this is only a small fraction of the reality. So we have in one cubic inch of substance a number which I cannot well pronounce. One grain would contain 1,000,000,000,000 molecules. It might give off millions of molecules every second, and yet it would be long before they would be all set free. The molecules are very small, but the apparatus for perceiving them by the sense of smell is very delicate. We have in the nose a ganglion—the olfactory ganglion—from which proceed a dozen or more nerve-threads into the nose, forming secondary ganglia, each ramifying into some thirty or forty in the upper part of the nose, above the ethmoid bone. They are so fine and delicate that I have an idea that they are perfectly capable of seizing hold of a single molecule. Suppose one grain of musk to last a thousand years; we have every second more than a million molecules to be set free. That, in my opinion, explains why you can smell some substances so long.

Dr. Rynear. Can you explain why certain odors are so generally attractive, while other odors are so generally disgusting?

Dr. Mayr. There is a suggestion implied in an odor that usually condemns or recommends it. If there is a pleasant odor in a flower, that circumstance shows that it wishes to attract us. And we are educated to like certain odors, as those of flowers. Flowers are given to us by our friends, and we like them. If you show a dog a violet, the dog does not appreciate it, because he has not been educated to appreciate it. We are educated to appreciate it, and therefore we do, and when we get a violet we remember unconsciously our youth and its associations, and we like it. Why have many animals the most horrid and disgusting excrement? Experiments have been made with dogs that have been deprived of their olfactory bulbs by mixing with their food some of their excrement, and in a short time all those dogs were afflicted with tapeworms, which killed them. The excrement of animals is always a highly pernicious substance, containing eggs of tapeworms. Because of their bad odors we are deterred from eating many substances that would be injurious to the tribe and to the community. In many cases we are warned against poisonous gases by their odor. Sulphureted hydrogen is a poison, and its odor is offensive to us. I suppose that in such cases the smelling nerve is conscious of a danger, and that nerve telegraphs back to the brain,—something wrong here! This seems to me to be the philosophy of many of these phenomena.

Dr. M. L. Rhein. I have noticed after a prolonged operation a peculiar dryness of the pharynx. I do not know whether it was due to an unusual amount of energy expended or not, but I have noticed it in myself, and, apprehensive that my breath might be unpleasant, I have used a cleansing spray. A very good one, called Dobell's solution, is composed of bicarbonate of soda, biborate of soda, carbolic acid, glycerin, and water. It is a pleasant spray, and when applied to the parts, and followed by some astringent, almost always alleviates this trouble of the operator. I generally follow it with a solution of tannic acid.

Prof. Mayr. It is an interesting fact that the gentleman has mentioned. I think I have observed the same thing. It is due, perhaps, to nervous exhaustion. In such cases swallowing a mouthful of water, or a little soda, will usually correct the trouble; simply moistening the mucous surface will ordinarily answer the purpose for which the nerves have sent out the signal of that unpleasant odor.

Adjourned.

B. C. Nash, D.D.S., *Secretary.*

FLORIDA STATE DENTAL ASSOCIATION.

Pursuant to a call, a large number of the dentists of Florida met in Library Hall, Jacksonville, October 15, 1884, and organized the Florida State Dental Association, by the adoption of a constitution, by-laws, and code of ethics.

The following officers were elected: James Chace, president; W.W. Townsend, first vice-president; W. McL. Dancey, second vice-president; Duff Post, recording and corresponding secretary; H. M. Granniss, treasurer.

A committee was appointed to draft a bill to be submitted to the State Legislature, and the secretary was instructed to mail to every dentist in the State a copy of a resolution passed by the association requesting them to use their influence with their representatives in the Legislature to vote in favor of the bill becoming a law.

Dr. W. McL. Dancey was unanimously elected delegate to both the Southern and American Dental Associations.

The association then adjourned to meet in Tampa during the first week in May, 1885.

Duff Post, *Secretary*, Tampa, Fla.

OHIO STATE DENTAL SOCIETY.

The Ohio State Dental Society was reorganized and chartered October 31, 1884.

The following are the officers for the ensuing year: C. H. James, president, Cincinnati; H. H. Harrison, vice-president, Cadiz; J. R. Callahan, secretary, Hillsboro; G. W. Keely, treasurer, Oxford.

The society will meet at Chillicothe on the last Wednesday of October, 1885.

J. R. Callahan, *Secretary*, Hillsboro, Ohio.

BIBLIOGRAPHICAL.

The Science and Art of Surgery: A Treatise on Surgical Injuries, Diseases, and Operations. By John Eric Erichsen, F.R.S., LL.D., F.R.C.S. Eighth edition, revised and edited by Marcus Beck, M.S. and M.B., London, F.R.C.S. With 984 engravings on wood. Vol. I., octavo, pp. 1124. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $4.50; sheep, $5.50.

More than thirty years have passed since this work was first published, having reached in its own country an eighth edition. The standard character of the treatise is too well known to make an extended notice necessary at this time. The volume before us gives evidence of careful elimination, condensation, and addition. Special attention is given to various new operations practiced in modern surgery, to surgical hygiene, and to diagnosis. In all respects the book has evidently been brought up to the advanced methods of modern practice.

The American reprint, which appears simultaneously with the English edition, is dedicated by the author to the surgical profession of the United States of America, in testimony of the esteem which he entertains for it, and of the cordial friendship that has long existed between him and many of its members. As an epitome of modern British surgery, this work is without a rival.

THE ELEMENTS OF PHYSIOLOGICAL PHYSICS: An Outline of the Elementary Facts, Principles, and Methods of Physics, and their Applications in Physiology. By J. MCGREGOR ROBERTSON, M.A., M.B., C.M., Muirhead Demonstrator of Physiology in the University of Glasgow. Illustrated with 219 engravings on wood. 12mo, pp. 528. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $2.00.

We cannot do better, in explanation of the character of this volume, than to quote from the author's preface: "The modern development of physiology has been largely due to the application to this branch of science of physical and chemical principles and laws. Physics and chemistry are now constantly appealed to for aid in working out physiological problems; and the physiologist finds himself continually resorting to physical methods and apparatus, both for purposes of illustration and research. In some respects, therefore, the study and the teaching of physiology have become increasingly difficult because of the broadening of its relations with other sciences."

In this volume the elementary facts and principles of physics are presented, together with their physiological applications, with a concise description of physical apparatus and methods as adapted to physiological purposes. The book seems to be admirably adapted for the purpose intended, and the student of physiology cannot fail to find it of great value.

DOCTRINES OF THE CIRCULATION: A History of Physiological Opinion and Discovery in Regard to the Circulation of the Blood. By J. C. DALTON, M.D. Large 12mo, pp. 296. Philadelphia: Henry C. Lea's Son & Co., 1884. Price, cloth, $2.00.

This volume, as its title implies, is devoted to a history of opinions held with reference to the circulation of the blood, from Aristotle down,—a history of great interest because of the importance of the physiological function considered. We have here a connected view of the progress of science, instructive as well as interesting, and showing the obstacles which had to be overcome before the attainment of correct knowledge concerning a subject which now seems so easily demonstrable.

INDEX-CATALOGUE of the Library of the Surgeon-General's Office, United States Army. Authors and Subjects. Vol. V., Flaccus–Hearth. Washington: Government Printing Office, 1884.

We have received the fifth volume of this great work, which embraces authors and subjects in strict alphabetical arrangement from Flaccus to Hearth. When we say that this portion of the alphabet alone extends to a volume of 1055 quarto pages, a large proportion of it in fine type, our readers may form some estimate of the magnitude of the work when complete, of the immense amount of scholarly labor bestowed upon it, and of the credit which is due to those who projected it. The volume contains over 15,000 author-titles, representing 5755 volumes, and 12,896 pamphlets; also, 8069 subject-titles of separate books and pamphlets, and 34,027 titles of articles in periodicals. The most extensive subject in this volume is "Heart," one hundred pages being required to cover references to the literature of that topic.

PAMPHLETS RECEIVED.

Oral Hygiene, by Meyer L. Rhein, M.D., D.D.S., New York. Read before the First District Dental Society, State of New York, May 6, 1884. Reprinted from "The New England Journal of Dentistry."

Club-Foot: Is Excision of the Tarsus Necessary in Children? By De Forest Willard, M.D., lecturer on orthopædic surgery, University of Pennsylvania, etc. Extracted from the Transactions of the Medical Society of the State of Pennsylvania for 1884. Philadelphia: Collins, printer, 1884.

OBITUARY.

DR. WILLIAM M. HERRIOTT.

Died, at Indianapolis, Ind., November 4, 1884, DR. WILLIAM M. HERRIOTT, in the fifty-third year of his age.

Dr. Herriott was born in Allegheny county, Pa., April 19, 1832. When quite young he went to Ohio with his parents, who settled near New Concord, in that State. He studied dentistry with Dr. Burlan, at Cambridge, and began practice about the year 1857, in Zanesville, where he continued until 1874, and during that extended period he associated himself actively with his profession, taking a special interest in the Ohio State Dental Society, of which he remained a member until his decease.

About ten years since Dr. Herriott's failing health admonished him to give up active practice, when he removed to Indianapolis and opened a depot for dealing in dental goods. During his busy life in Indianapolis he still kept the good of his profession at heart, and became one of the founders of the Indiana Dental College, as well as an active member of the Indiana State Dental Association. He was well known and prominent in dental circles, and highly esteemed as a man of honor and strict integrity. The business which he founded in Indianapolis is continued by his widow, with the active coöperation of his son, William M. Herriott, Jr.

DR. J. S. SWARTLEY.

Died, at Oak Park, Chicago, Ill., August 18, 1884, DR. J. S. SWARTLEY, in the fifty-third year of his age.

Dr. Swartley was born in Franconia, Pa., October 7, 1831, and his first experience in a dental office was under the tutelage of Dr. Spencer Roberts, of Philadelphia. He commenced practice in Pennsburg, Pa., where he remained for about seven years, but removed to Chicago in 1865, where, by perseverance and skillful work, he gathered a large clientage, and established a lucrative practice. He was considered to be one of the best operators in Chicago, and always maintained a high standing in the estimation of his professional brethren. He suffered in his latter years from fibrous tumors of the hip, and from time to time operations were performed with relief. Something over a year ago, however, the tumors involved the abdomen, and finally caused his death.

The Chicago Dental Society, of which Dr. Swartley was a member, upon the recommendation of a committee consisting of Drs. J. A. Swasey, George A. Christman, and Truman W. Brophy, adopted resolutions of respect to the memory of the deceased, testifying to his ability, unsullied reputation, high sense of honor, and uprightness as a citizen ; also, expressing sympathy with his family, and ordering the resolutions to be spread upon the records of the society.

DR. MIGUEL V. CRESPO.

DIED, at Lima, Peru, September 22, 1884, Dr. MIGUEL V. CRESPO, in the fifty-eighth year of his age.

Dr. Crespo was born in Havana, Cuba, September 12, 1827. He studied dentistry, and, after some extended travel, settled in the city of Lima, Peru, where he practiced his profession with success for about fourteen years. He was highly esteemed by his patients and numerous friends, and was upright and just in his business relations.

PUBLISHER'S NOTICE.

THE DENTAL COSMOS FOR 1885.

With this number the Dental Cosmos completes its Twenty-sixth Volume. Its large subscription list, steadily advancing year after year, gives the best evidence of its appreciation by the profession. Its title, originally given it to indicate the intent of the publisher to make it cover the dentists' world of theory and practice, has an added significance in the fact that its circulation has become world-wide—prëeminence in circulation as well as in the quality of its contents being by common consent accorded to it. But ambition "grows by what it feeds on," and intent and desire coincide to make the past but the stepping-stone to better things. If expenditure and effort may keep the Dental Cosmos at the head of dental literature, there still shall be its place. Its influence shall be exerted not alone in registering, but in promoting scientific advancement, and so far as possible it will present whatever of value may be developed in theoretical and practical dentistry. Sixty-four pages per number—making a volume of seven hundred and sixty-eight pages—of purely dental matter must be worth many times the subscription price of the journal to any dental practitioner.

Those who wish to subscribe or renew will find a blank form immediately preceding the advertising pages of this number. Subscriptions are required to commence with the January or July number. Prompt renewals and subscriptions are earnestly solicited. Price, $2.50 per annum, including postage to the United States and Canada. Subscribers in all other countries will remit the postage, the rate of which to Universal Postal Union countries is 50 cents; to Australia and New Zealand, 96 cents, per annum.

The S. S. White Dental Manufacturing Co.

Philadelphia, December, 1884.

PERISCOPE.

The Antrum of Highmore, and some of its Diseases.—The antrum is a large cavity in the body of the maxillary bone. Above is the floor of the orbit, internally the nasal wall, below the alveolar process. It varies in size and capacity (one to eight ounces), and is larger in the male than the female; it diminishes in old age and after the loss of the teeth. The two antra may be unsymmetrical in size and shape, and sometimes extend into the malar bone, forming a second cavity. It is lined by mucous membrane, and communicates with the nasal cavity in the middle meatus by an opening that varies in size.

If the sinus is large, the second bicuspid and first and second molars may be in close relation to the floor. The roots of the first molar often pierce through the bony floor, and are only covered by the mucous lining of the antrum. The posterior and middle dental nerve courses in the posterior and anterior walls. Disease seldom originates in this sinus, but it is often invaded by disease from without.

Suppuration in the antrum, in the great majority of cases, is the result of suppurative pulpitis, most commonly from the first molar. Caries of the tooth sets up suppurative pulpitis, and the discharge passes through the apices of the roots into the antrum. If the trouble is from the other adjacent teeth, the pulpitis will result in a maxillary abscess, which may then extend into the antrum.

In struma, syphilis, and mercurial poisoning the inferior and middle turbinated bones become necrosed with the antral wall. Trouble in this sinus is sometimes the result of traumatic causes.

Septicemia is one of the dangers in pent-up pus in the antrum—indeed, is more or less present in nearly all cases, particularly so if there is also a maxillary abscess.

Symptons of antral abscess are at first a dull aching pain, and as the disease advances infra- and supra-orbital neuralgia, throbbing pain, with redness, swelling, and fluctuation, with rigors and fever. As the pus accumulates, the nasal wall—the weaker one—is quite apt to be forced toward the septum, often producing complete stenosis of the nostril, with, possibly, a discharge of pus. If there is much continued pressure, the stronger wall shows signs of distention, with swelling of the cheek, or the palate is forced downwards. Occasionally the orbital wall will be forced upwards, producing exophthalmus.

Treatment consists in the evacuation of the pus by the extraction of the decayed teeth, and through the socket of the first molar as the most direct course to the floor of the antrum by means of a trephine. This is most efficiently done by the surgical engine. The opening should be one-fourth of an inch in diameter to give free vent to the discharge. This should not be allowed to close until all discharge cases.

If the case is of long standing, an opening should also be made from the inferior meatus through the nasal wall into the antrum. The sinus is to be kept clean by thymolized water, or bichloride of mercury (1 in 1000) and water. Boric acid or iodoform and camphor powder is to be blown in by means of an insufflator.

If the antrum trouble is the result of constitutional disease, appropriate remedies are to be used in connection with the local treatment.

Catarrh of the antrum is a disease in its earlier stage too little recognized. It coexists with catarrh of the nasal cavity, and is often the primary cause. The opening from the nasal cavity becomes enlarged, and the fetid catarrhal secretion passes into the nasal cavity. This is one source of the trouble called ozena. There may also be necrosis of the inferior turbinated bone.

The treatment in such cases is to make a free opening from the inferior meatus into the antrum, all necrosis to be removed if any exists. It is to be kept thoroughly cleansed and the powders blown in.

Hydrops antri is a disease characterized by a gradual painless distention of the walls of the antrum, probably by the changes constantly going on in the pent-up secretion. This fluid is clear or yellowish, frequently containing flakes of cholesterine, and is supposed to be the contents of cystic growths within the antrum.

Treatment consists in trephining, cleansing, and use of the powders.

The antrum is often invaded by nasal tumors, which occasionally pass through it and emerge externally into the cheek.

Malignant disease occasionally has its seat here.

Foreign bodies, such as teeth, are found in the antrum and sometimes are in malposition, or by some accident are forced into the sinus.

Lacerations and fractures of the alveolus, by extracting the molars, are frequent causes of antrum trouble.

Case I. Suppurative Disease of the Antrum of Highmore with Dislocation of the Cartilaginous Nasal Septum of twelve years' standing.—Dr. D. M., of Ontario, Canada, consulted me in November, 1879, and gave the following history: In 1865 had pain in his second left superior molar, and an unsuccessful attempt was made to have it extracted. This probably resulted in rupturing the vessels of the dental pulp, as the doctor says the tooth was started from its socket and then pushed back again. Some time after, from intense pain and swelling of the face, a second attempt was made to extract the tooth. This was not entirely successful, as a root was left in the jaw. From this time the discharge began, and continued until I saw him, more than twelve years after.

He presented the following condition: First and second molars gone from the left superior jaw. Above the alveolus, at the position of the second molar, was a fistulous opening, made by trephining some years ago into the antrum. In this opening he wore a hard-rubber drain-tube, but as it was small in calibre and too high up in order to drain the discharge from the antrum, it was of very little use. It also excited granulations in the cavity. A gelatinous polypus was found in the left nostril, growing from the middle turbinated bone. This hung by a pedicle over an opening made by necrosis of the inferior turbinated bone and the nasal walls of the antrum.

From the blowing of the left nostril, by closing the right with the thumb, to free it from the constant discharge, the lower end of the cartilaginous nasal septum was dislocated and turned into the left nostril, preventing respiration, except when forced. In the pharynx a muco-purulent track was to be seen on the left of the vertebral ridge, caused by the discharge passing down from the posterior nares. This produced a good deal of expectoration. This trouble continuing for so long a time, had very much affected his general health, and prevented him from attending to all his professional duties. On the doctor's first visit, in November, 1879, I only removed the polypus, as it was necessary for him to return immediately home to meet some professional engagements.

In April, 1880, he returned, and under an anesthetic I first made an operation on the dislocated nasal septum. An incision being made through the soft parts, I amputated the protruding cartilage of the septum. The soft parts were brought together and held by small silk sutures; this healed by first intention, and in a week's time it would be difficult to tell where the incision had been made.

The next part of the operation was the trephining through the alveolar process at the position of the first molar, directly into the bottom of the antrum, by means of a large bone-cutting drill driven by the surgical engine. This opening gave exit to a fetid discharge, pent up in the cavity of the antrum. The last part of this operation was the removal, by means of the revolving bone-cutters, of the necrosed turbinated bone and the naso-antral wall, through the anterior nares. This made an opening from the nose into the antrum, extending from the floor of the inferior meatus to the middle turbinated bone and antero-posteriorly about an inch. There was considerable hemorrhage, which was easily controlled.

Through these openings the antrum was freely washed out with thymolized water, and medication applied, which consisted in blowing into the antrum the idoform and camphor powder by means of the insufflator. There were present at this operation Drs. Farnham, Carey, Warden, and Bucklin, of New York; Marvin, of Brooklyn; and Braden, of Michigan. Twelve months after the operation the muco-purulent discharge ceased, and he is now in robust health. The respiration through the occluded nostril is quite free. The opening from the mouth into the antrum has now closed up. A permanent opening will remain in the naso-antral wall where the necrosis was removed.

Case II. Suppurative Disease with Exophthalmus.—In July, 1881, Dr. Carey referred to me Mrs. A. C., who had extensive swelling of the left cheek, with exophthalmus. Nostril on that side closed; she suffered great pain; teeth on that side much decayed. Treatment consisted in removing the decayed teeth and trephining through the alvelous into the antrum. The antrum was also trephined through the naso-antral wall in the line of the inferior meatus. The pent-up fetid pus flowed freely from the antrum through these openings, and gave her great relief from pain. The sinus was kept thoroughly cleansed and the swelling and exophthalmus gradually passed away.

Case III. Tooth found in the Antrum.—I was consulted in 1869 by Mrs. S. A., of Philadelphia, Pa., who gave the following history:

Having pain on the right side of her mouth, she had some decayed teeth extracted. Severe pain soon returned, and had continued some months before I saw her. There was great swelling of the jaw and face; palate forced downwards; distention of the naso-antral wall, with some discharge from the nostril and alveolar process. Administered an anesthetic and trephined through the track of the fistulous opening in the alveolar process, which was necrosed into the antrum. On entering the antrum, the trephine struck against some hard foreign body. After the opening had been enlarged, a tooth was found in the antrum and removed with all the necrosed bone. This operation removed the entire floor of the antrum. As all the periosteum was preserved, the case recovered rapidly and left very little deformity.

The probable explanation of the presence of this tooth in the antrum is as follows, viz.: A suppurative pulpitis was followed by a maxillary abscess around the roots of the molar; the pus finding its way into the antrum, produced inflammation and suppuration, resulting in alveolar necrosis, and when the teeth were extracted this one was forced into the antrum in attempting to apply the forceps.

Case IV. A Tooth Developed in the Antrum.—Isaac C., aged 18 years, was brought to me by Dr. Carr. The young man had been suffering pain in his right superior maxilla, which commenced six years before, and had steadily increased up to the time I saw him. It was thought at first to be an alveolar abscess, and the doctor lanced it, but with only temporary relief to his pain. There was found on examination the following condition: There was a swelling commencing at the canine fossa and extending back to the hamular process; stenosis of the right nostril with naso-pharyngeal catarrh. All the teeth on that side of the mouth were developed and in normal position with the exception of the cuspid. From the absence of the tooth and the nature of the discharge that occasionally came away, together with the other symptoms, I was of the opinion that it was a dentigerous cyst.

Treatment consisted in placing the patient under an anesthetic, and pulling well back the cheek by means of a retractor, and in making an incision from the canine fossa backwards one and one-half inches, and three quarters of an inch above the border of the gum. The periosteum was now denuded from the bone, and by means of the revolving bone-knives the cyst was opened into, and quite a quantity of an amber-colored liquid escaped. On a careful examination of the interior of the cyst, the cuspid tooth was found fully developed and lying in the bone of the floor of the antrum, the root presenting anteriorly. The soft parts that were denuded were united by suture, the anterior corner being left for the purpose of cleansing the antrum and cyst. A reproduction of bone took place from denuded periosteum, and six months after nothing remained to show that any operation had been performed. The stenosis of the nostril was relieved by extirpating the inferior turbinated bone by means of the revolving scissors and surgical engine, in order to make a free passage.

Case V. Abscess of the Antrum of ten years' standing.—W. N., aged 51 years, born in England, had tooth disease, commencing ten years before, from which time he had had neuralgia, with nasal catarrh. After treatment by his family physician he was referred to a specialist, by whom he was treated for naso-pharyngeal catarrh, but he steadily grew worse and gave up treatment. Suffering from pain and the discharge, he was unable to sleep at night in bed, but reclined in a chair.

When I first saw him he was suffering intense infra- and supra-orbital neuralgia, with rigors and fever; slight redness and swelling of the right cheek; muco-purulent discharge from the right nostril. All the molars and the second bicuspid were gone. The bicuspid had been removed not many days before.

Treatment consisted in trephining through the alveolus into the antrum, and in enlarging the opening in the naso-antral wall into the inferior meatus. The discharge was very fetid. The antrum was kept thoroughly washed out, and boracic acid blown into the antrum and into the nostril. The passages were kept open, the treatment carried on for several months, and he entirely recovered. —*D. H. Goodwillie, M.D., in Philadelphia Medical News.*

PERMANGANATE OF POTASSIUM: ITS ACTION AND USES.—There is a general feeling of uncertainty regarding the real value of the permanganate of potassium as a remedy. Sharing in this to some extent, and desirous of arriving at definite conclusions, I have undertaken to collect the available evidence. This consists, chiefly, of clinical observation, and my own has been supplemented by such published experiences as have rewarded my search of authorities. * * * Before discussing its actions and uses, its physical and chemical qualities should be stated.

According to the United States Pharmacopœia, permaganate of potassium occurs in "deep, purple-violet, or nearly black, needle-shaped rhombic prisms, of a metallic lustre, permanent in the air, odorless, having a sweet, afterward disagreeable, astringent taste, and a neutral reaction. Soluble, with the exception of a scanty brown residue, in 20 parts of water at 59° Fah. (15° C.), and in 3 parts of boiling water."

According to the new notation, permanganate of potassium is represented by the formula $K_2Mn_2O_8$; and to the old, $KO.Mn_2O_7$. It is remarkable for the quantity of oxygen which it contains, and for the readiness with which it yields it up in its most active form, or as ozone;—yields it up so readily that it is one of the reagents used to determine the presence of organic matter in potable waters. This process illustrates one of the functions performed by permanganate of potassium in the human economy. The fine purple color of the solution of this salt in pure water is quickly discharged when brought into contact with organic matter; the oxygen seizes on and oxidizes the organic matter, and the permanganate is reduced correspondingly, the color changing to a dirty brown. It is this oxidizing power for which this salt is now employed as a deodorant and antiseptic.

The foul odors arising from decomposing matter are due chiefly to the compounds of hydrogen with sulphur and phosphorus—the sulphide and phosphide of hydrogen and some other products. The oxygen in its nascent state seizes on the hydrogen, and sulphur and phosphorus are set free, whence the destruction of odor. The chemical action which removes foul odors does not, necessarily, imply the destruction of germs and other *materies morbi.* Bacteria, micrococci, and other minute organisms, so often associated with the ordinary products of putrefactive decomposition, are now known to be the cause of, or at least to convey, the poison of some diseases. Active oxygen, or ozone, or nascent oxygen, has an oxidizing or destroying action on some of these pathogenic agents, and hence permanganate of potassium, whilst a deodorant, is also antiseptic.

Brought in contact with snake poison, it destroys its toxic power. Thus, as Lacerda was the first to show, if inserted into the wound made by a noxious reptile, the poison is decomposed, and, consequently, has no effect on the system.[1] Lacerda, it is true, supposed that this agent would prove equally effective when administered by the stomach—that it would antagonize and render harmless the poison introduced at any point; but this supposition has proved to be erroneous. The effect of permanganate of potassium on animal poison is chemical; it is antidotal, but not physiologically antagonistic; and hence, to be effective, it must be brought into immediate contact with the poison, which is oxidized, and its power thus destroyed.

Brought in contact with the tissues of the body, permanganate of potassium has an effect determined by the condition of the part. On the unbroken integument, external and internal (mucous membrane), it does not have an irritant action, but the oxygen readily assails the uncovered tissue. It stains the skin a brownish color, and, applied to an abrasion, causes considerable smarting and burning, and is very superficially caustic.

* * * As this salt is so readily decomposed, yielding up its oxygen to any organic matter present, it is obviously necessary to be very careful in preparing and administering it.

* * * Ordinary distilled water, after standing a few hours exposed to the air, begins to exhibit evidences of turbidity, due to the growth of an organism, a penicillum; and, after some days, it becomes so much clouded with organic matter as to be unfit for the solution of permanganate of potassium. River water or rain water, boiled and filtered, may suffice for immediate use; but, whenever it can be obtained, fresh distilled water should be used for this purpose. A pellet of this salt may be used to determine the requisite freedom from organic matter. Dropped into the water under examination, the beautiful violet color imparted to it should not be discharged. The prompt disappearance of the color signifies the presence of chemical agencies fatal to the permanence of the salt.

* * * *Topical and Disinfectant Uses.*—Permanganate of potassium has long been known as a disinfectant and deodorizer. Since the agency of minute organism, as bacteria, bacilli, micrococci, etc., in setting up septic processes in the body has been established, the various substances employed as disinfectants have been assigned to different relative positions, for now the important point is to procure the death of the living germs and their progeny. An agent destroying foul odors does not necessarily, does not indeed usually, destroy the germs of disease.

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[1] Bulletin Gén. de Thérap. Vol. 101, p. 325, and vol. 104, p. 556.

The permanganate of potassium is to be classed with the "deodorizers" rather than with the "antiseptics." From this point of view it is an "elegant" disinfectant. In an elaborate research on the antiseptics and their power to destroy bacteria, Bucholtz[1] does not include this salt amongst the list of agents possessing the power to destroy bacteria and similar organisms. Again, M. Ratimoff,[2] in a paper on antiseptics and the results of their use in surgical practice, has also ignored the permanganate, not mentioning it amongst those agents that have true antiseptic power. The most thorough, and from the modern point of view the most scientific, treatment of the subject of antiseptics is the essay of Dr. Miguel.[3] He assigns permanganate of potassium to a group containing the salts of lead, zinc, nickel, and cobalt, alum, tannin, the mineral acids, and other agents. The first group is composed of "substances eminently antiseptic;" the second of "substances very strongly antiseptic;" the third of "substances strongly antiseptic;" the fourth of "substances moderately antiseptic;" the fifth of "substances feebly antiseptic;" and the sixth of "substances very feebly antiseptic." Permanganate of potassium, in a list of 91 agents having qualities more or less antiseptic, stands 44, the bichloride of mercury being first. The important point, however, to be determined in respect to the powers of any antiseptic is its effect on the vitality of living germs or microbes. In the attempt to ascertain this quality of any antiseptic, certain precautions must be observed if the results are to possess any real value. These precautions have been well stated in a memoir of N. Jalan de la Croix,[4] whose experimental inquiry was conducted under the observation of Prof. Dragendorff.

Bacteria developed in different liquids do not possess the same power of resistance to the action of antiseptics; they resist more successfully when contained in their native fluid than when in culture solutions. The same facts are true of the spores, which are sterilized with more difficulty in their native element than when transplanted into foreign fluids.

Most of the experiments made have been with microbes contained in culture-fluids; for example, the very able and elaborate research made by Dr. Sternberg.[5] Under these circumstances the results are better than can be achieved from the use of the same antiseptics in disease *cœteris paribus.* Sternberg assigns to bichloride of mercury (mercuric bichloride) the first place as an antiseptic; yet he puts permanganate of potassium second. Whilst bichloride is effective in the proportion of 1 part in 20,000 of fluid, the permanganate of patassium acts to the same degree in the proportion of 1 part to 833 of solution. The bichloride is, therefore, about twenty-five times more efficient. We must acknowledge a certain sense of scepticism in examining these experiments of Dr. Sternberg, as able and well-considered as they unquestionably are. We find it difficult to understand why liquor zinci chloridi has no germicide action, whilst a 2 per cent. solution of the same is effective in the proportion of 1 part to 50. As the experiments of Dr. Miguel have been more recenty performed, and the conditions insisted on by Jalan de la Croix more perfectly observed, we may rather accept his conclusions in regard to the real value of permanganate of potassium as a germicide.

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[1] Antiseptica und Bakterien. Archiv f. experimentelle. Pathologie und Pharmakologie. Band iv., p. 1.

[2] Archives de Physiologie Normale et Pathologique. Vol. iv., 3d series, p. 142.

[3] Bul. Gén. de Thérap. Vol. 107, p. 80 *et seq.*

[4] Das Verhalten der Bakterien das Fleisch-Wassers gegen einige Antiseptica. Archiv für experimentelle Pathologie und Pharmacologie. 1881. Pp. 175 and 225.

[5] Experiments to Determine the Germicide Value of Therapeutic Agents. By George M. Sternberg, M. D., U. S. A. *American Journal of Medical Sciences*, April, 1883.

As a deodorant, and so far a disinfectant, this agent has a large sphere of usefulness in medical practice. Sufficiently concentrated, it has an effect on the constitution of certain animal poisons. The fact first ascertained by Lacerda—that permanganate of potassium decomposes and renders harmless the poison of venomous snakes—seems to contradict the results of the experimental investigations regarding its germicide power. The destruction of the animal poison takes place on contact, but the same agent is completely inefficient when acting through the whole mass of the blood. It is, however, a question of the strength in which the permanganate is used. Topically, it is possible to make applications strong enough to decompose animal poisons without, at the same time, injuring the textures to which they are adherent.

* * * As a disinfectant and deodorant, a solution of two to five grains to the ounce is useful in otorrhea, ozena, fetid breath, fetid sweat of the axilla and feet, and in general wherever on the surface of the body there are odorous discharges and emanations. For general disinfectant purposes it is rather an expensive agent, even if equal to the active and cheaper agents now utilized for this purpose.

As has been already stated, permanganate of potassium is the most generally useful test for determining the presence and amount of organic matter in potable waters, a standardized solution being employed. It may, also, be used to free drinking water from dangerous impurities when the drinking of contaminated water may be imperative.—*Dr. Roberts Bartholow, in Medical News.*

Sanitas as a Disinfectant.—In your issue of the 11th inst. you publish some criticisms of Mr. A. Wynter Blyth on the exhibits of disinfectants at the Health Exhibition, and among them I find some notes relative to "Sanitas," for the knowledge and use of which reagent I hold myself responsible. I shall be glad if you will allow me to make a few remarks upon this subject.

Mr. Blyth admits that sanitas is a good antiseptic, but, from certain microscopical observations made upon the spores of anthrax, he adds, "I would not rely upon it in serious disinfection,—that is, in cases of disease." In another place he says, "A non-poisonous disinfectant is certain to be useless as a germicide."

Now, to take the last statement under consideration,—in the first place, I dispute its accuracy. Upon what grounds is Mr. Blyth certain? He states none, but makes the barren assertion. As grounds for disputing this statement, I may mention the following facts: 1. Oxygen (a non-poisonous substance) acts as a germicide to all micro-organisms classified by Pasteur as anærobies. 2. Peroxide of hydrogen (a non-poisonous substance) has been proved by my own investigations[1] to act as a germicide to micro-organisms that originate putrefaction, and my results were subsequently confirmed by Guttman and Frænkel.[2] They were also confirmed by Mr. W. M. Hamlet,[3] who observed that, of all the many chemical substances he examined, peroxide of hydrogen acted most fatally to bacterial life. Further proof of the germicidal character of this substance has been given by M. Baldy, and emphatically by MM. Paul Bert and Regnard.[4] Sanitas in all its forms contains or yields peroxide of hydrogen. 3. Thymol can scarcely be called a poisonous substance, and it is admitted to be a powerful germicide. Sanitas contains thymol. 4. It does not follow that, because a chemical agent is non-poisonous to man, it will prove harmless to micro-organisms. There is nothing in common between the two orders.

Secondly, I cannot accept Mr. Blyth's provisional classification of disinfectants. It is sufficient, in my opinion, to call those substances, broadly, disinfectants which by their use limit in any sense the spread of disease. The precise ways in which disinfectants may act are very numerous. It is doubtful (even upon Mr. Blyth's own showing) whether any chemical substances can act as direct poisons to anthrax spores. Many substances, including sanitas, kill off fully-developed micro-organisms, as they are produced

Disinfectants, then, may act in the following ways, among others: 1. They may affect micro-organisms in the sense that anesthetics act on man and cause death in consequence. 2. They may act as direct poisons to micro-organisms. 3. They may also lead to the death of micro-organisms indirectly in a number of ways, as, for instance, tannin does by chemical combination with albuminous principles, resulting in the production of substances that micro-organisms cannot so readily, if at all, decompose. Or they may change the character of the nidus by oxidation, or chlorination, or otherwise chemically, so that it no longer serves as pabulum to the micro-organisms, which then die off in consequence.

In all probability further investigation will prove the ubiquitous character of pathogenic micro-organisms, and while lending confirmation to the view even now largely entertained as to the folly of ever hoping to exterminate them by direct attack with parasiticides, which kill the host also, it will accentuate the necessity of directing measures to the prevention of their development under certain conditions at present very imperfectly understood. In the meantime, just as Sir Joseph Lister has said, there is no necessity for belief in the germ theory as a foundation to the practice of antiseptic surgery, the practical study of putrefaction, its causes and prevention, alone sufficing; so also the same study will suffice to guide the principles of disinfection at large. All good antiseptics are necessarily good disinfectants, and all the experiments that can be devised or the arguments that may be employed will, I am confident, fail to disprove the fact. As Dr. Gamgee has expressed it,[1] "I am now convinced that every good antiseptic is really a destroyer of disease germs; an arrest of development is insured."

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[1] *Chemical News*, vol. xxxiv., p. 127.

[2] *Lancet*, June 22, 1878.

[3] *Jour. Chem. Soc. Trans.*, 1881. p. 326.

[4] *Compt. Rend.*, 94, 1383-1386.

I go further, and say that, so far as the treatment of the human body is concerned, substances which are poisonous, or exhibit toxic effects, should never be used as antiseptics and disinfectants, for science has provided innocuous and non-poisonous substances which do all that is wanted.

Finally, a few words regarding Mr. Blyth's observation on anthrax spores. Of all the substances examined by him, none killed the spores, but many of them (including sanitas) delayed their growth. Now, Mr. Blyth says nothing as regards the action of these re-agents upon the fully-developed micro-organisms and their functional activity. Assuming, that is to say, that the spores were unmistakably anthrax spores, and could produce disease in infected animals, he fails to show that after treatment with sanitas, *or in its presence*, the spores retained infectivity, and until that is proved I decline to accept the conclusion that Mr. Blyth would draw respecting the treatment of this cattle disease, and even if he could prove it (and I am convinced he cannot) I would only accept the conclusion in regard to that one particular disease.

To properly test the value of any disinfectant, it is necessary to test all its properties, and not one particular property alone, and in relation to not one infectant, but all infectants. Mr. Wynter Blyth has only made a few passing observations. On the other hand, I can, if called upon, adduce a great mass of evidence in substantiation of my assertion that in sanitas we have the best disinfectant, and one that can be fully relied upon in the most serious cases of disease. I do not, however, seek to obtain a gratuitous advertisement for a preparation in the sale of which I am interested. My only object is to direct attention to the defects of Mr. Blyth's observations, and as a scientific man, who has made the subject at large a matter of special study, to contest his conclusions. One most important matter is left entirely out of consideration by Mr. Blyth, and that is the probability that micro-organisms convey disease and death not by their mere presence in the human body, but by the direct chemical and physiological properties of their secretions or life-products. The yeast-plant secretes a chemical substance which splits up sugar into alcohol and carbonic dioxide. Other micro-organisms give rise to the production of sepsin, which is a chemical infectant. It is almost certain that the infectious and contagious diseases which owe their origin indirectly to micro-organisms are similiary directly produced by chemical products elaborated or secreted by them. If that be so, the use of caustic and poisonous disinfectants sinks into insignificance, and cultivations should be conducted not merely for obtaining pure growths of particular micro-organisms, but with the object of ascertaining the effects of inoculating animals with the cultivation mixture before and after sterilization (conducted without chemical alteration of attendant substances), and before and after attempted disinfection. This subject is of the very greatest importance, and I should gladly welcome any results in this clearly defined direction.

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[1] *Chem. News*, January 27, 1881.

In conclusion, I may add that this is a matter to which I have paid much attention in the forthcoming new edition of my "Nature's Hygiene."—*C. T. Kingzett, F. I. C., F. C. S., in the Medical Times and Gazette.*

On Lancing the Gums.—Mr. Edmund Owen said: There are two reasons which, to myself at least, seem good for my venturing to bring this short communication before you this evening. The first is that I have but a slight practical acquaintance with the subject; the second is that, if the question have the real importance which it was formerly considered to have, the sooner one puts oneself in the proper course the better. With a due regard to these two objects, I will prefer to throw out suggestions for any discussion that may ensue, rather than attempt to draw conclusions, or advance any theory of my own. Not many years ago almost every practitioner carried a silver lancet-case, where now he would carry a thermometer. The lancet then seemed to be used for severing every clinical knot in the maladies of infancy and early childhood which he was not able to untie. Steadily has the thin-bladed instrument fallen into desuetude. Its place has been filled, I regret to say, by various blades, which, whether used for lancing the gums, for venesection, or for the opening of abscess, are far less suited for the purpose. But to sigh over the sepulcher of the lancet and the leech (for they lie together in the same dark tomb) is not to answer the question as to why the gums are now so rarely lanced. Has an improved condition of gum been evolved as the result of countless years of scarification? Has the process of dentition changed, or have our capabilities in clinical work improved? This last speculation is, I think, worthy of attention; but I am loath to admit it in its entirety, lest one should seem thereby to depreciate the scientific acumen of those many clear-headed and outspoken practitioners who have gone before, and with whom, in their writings, it is often both a pleasure and a profit to dwell. Dr. Combe, in "The Management of Infancy," remarks that, in the second stage of dentition, the gums are very painful, and marked with a pale or bright red elevation. He continues, that the infant "snatches at everything, and retains nothing. Nothing pleases him." He then speculates on the shape of the teeth as influencing their eruption, and appears to regard the process of dentition as being, for the most part, a mechanical one. Probably this theory was rather generally held a short time ago: the tooth was on the wrong side of a tough gum, through which the surgeon must help it with his lancet. Even at the present day, the public mind associates dentition with a certain amount of clumsiness or cruelty. How often does one hear such an expression as this: "My children always cut their teeth with diarrhea, or a large head." Was not the real explanation of all this usually to be found in the fact of the child being improperly fed? The obscure troubles often come on just as the infant is being weaned; and, from what I know on the matter of dieting at about this period, I should be inclined to think that the source of irritation is much more likely to be in the alimentary canal than in the gums. That a slight loss of blood from scarification of the gums might even in that case give relief, I am willing to admit; but I think that the saddle must often have been put on the wrong horse. How have the public become possessed of the questionable pathology; and how much truth is there in the theory? To compare the practice of lancing the infant's gum with that of cutting through a fibrous band or roll of mucous membrane which is preventing the complete emergence of the wisdom tooth of the adult is not, I think, quite fair. It has been remarked to me that it is strange that the molar teeth of the child do not demand help from the lancet; and that the sharp-edged teeth, the incisors, are those which are supposed to stand most in need of help. This fact is suggestive. Dr. Billard remarked that, if all that authors had written on the aberration of the process of dentition should be recorded, an extended chapter of absurdities would be the result. And, quoting Guersant, he says, "Most of the diseases of infancy have been attributed to teething. The difficulty of an accurate observation of diseases at this early age, and the little positive knowledge we possess in this department of pathology, have contributed greatly to the establishment of this opinion" ("Diseases of Infants," 1839, p. 201). There is one special trouble which is apt to be associated with dentition, though not dependent upon it, and which is very apt to be overlooked by the practitioner who is inclined to regard the eruption of the teeth as a morbid process; that is, the early stage of infantile paralysis. I would not pretend that one should be able to foretell the on-coming of the paralysis, when summoned to attend a young child with obscure feverish symptoms; but what I would venture strongly to urge is, that one should not content oneself with the suggestion that probably all the symptoms are due to the teething. On several occasions when I have been consulted with regard to the later stages of that disease—the wasted or deformed limbs—I have heard the mother remark reproachfully, if not bitterly, that the doctor assured her that that illness, of many months ago, was but the effect of the teething. I would repeat that dentition is almost invariably a simple physiological process. I would submit that, of the many ills to which tender flesh is heir, few arise from teething, though naturally they accompany it. I would offer a caution, that a careful look-out be kept for one of the most insidious of these ills—essential paralysis. Then, as regards the gum itself: what is the exact condition which demands scarification? When the alveolus is expanding, the tooth growing, and the enamel advancing, the gum must needs be fibrous and tough; but that it is not really inflamed is evident to the sight, as it is also from the fact that the infant delights in having it pressed and rubbed. Does one often find it red and swellen from inflammation? For years I have carried a lancet in my card-case, but I find no work for it upon the gums. Doubtless there are gums in need of scarification. Who sees them? Who lances them? Do the physicians? What have the family medical attendants to say upon the subject? Is lancing the gums much employed at the present day; is it little employed; is it "a good remedy out of fashion;" or do the rising generation suffer as little from its rather general disregard as they do from the increasing neglect of James's powder? At the end of the chapter on "Teething," Combe advises that, when there is much local or constitutional disturbance, the gum should be scarified with a lancet, and allowed to bleed freely, though not in the expectation of the tooth immediately following; and that in the second stage, when the tooth is about to appear, the lancing may be demanded for putting an end to suffering and averting danger. I would ask, in conclusion, if this local and constitutional disturbance, resulting from dentition, is often met with nowadays; and what are the "dangers" that are to be so averted? Last of all, I would like to hear from the dental surgeon as to what might probably have been the effect upon the development of the permanent teeth of the once widely-spread practice of lancing the gums.

Mr. Arthur E. Durham, president, observed that, in his student-days, lancing the gums was a routine practice followed in almost every case of illness during the period of dentition.—Dr. Clement Godson had frequently seen great relief follow the lancing of a gum when the tooth had almost reached the surface, and considered the treatment of great value in suitable cases.—Dr. Braxton Hicks was inclined to indorse the opinion expressed by Dr. Godson. The nervous economy of the child was exceedingly sensitive, and he thought there were a considerable number of cases in which reflex disturbance was set up by the eruption of the teeth.—Mr. Paramore believed that lancing the gums was frequently very useful.—Mr. Hamilton Cartwright was distinctly of opinion that both diarrhea and convulsions might be caused by dentition. There were two conditions under which lancing the gums was indicated; if the gum were tense and glistening at the epoch when the tooth was about to come forward, by cutting into the sac of the tooth great and immediate relief was afforded; secondly, in an inflammatory condition of the gums, with tumidity, but without the extreme tension of the first class of cases, incision gave relief; in the latter class of cases the treatment was empirical, but none the less successful.—Dr. C. J. Hare said that it was to him a matter of great surprise and regret that the profession should so blindly give way to fashion, as it had done on many points. Hundreds of lives had been lost by abandoning the use of bleeding; and, among the forms of bleeding, the practice of lancing the gums—that is, bleeding from the gums—was one that deserved to be revived or continued.—Dr. Webb had seen so many children on the point of death saved by lancing the gums, that he regarded it as a most valuable method of treatment.—Dr. Sansom, while admitting that many untoward symptoms were associated with the eruption of the teeth, doubted whether that cause was not invoked with too great frequency. In a paper published in the *Obstetrical Journal*, he had shown that the period of most frequent occurrence of diarrhea coincided with the period of dentition. He had found that it was very useful to rub the gums with glycerin, and had observed that the greatest amount of irritation occurred at the eruption of the first molars—Dr. Seymour Taylor believed that a horny condition of the gums was brought about by rubbing, and by chewing hard substances. Such a condition must obviously interfere with the eruption of the tooth.—Mr. B. T. Lowne thought that the theory that the eruption of the tooth could cause diarrhea was a mere hypothesis; the whole process was physiological, and not pathological.—Dr. R. Crocker thought that it was very seldom necessary to use the lancet.—Dr. W. A. Duncan had seen many cases of severe diarrhea and convulsions evidently due to teething, and relieved by lancing the gums. The mere lancing of the gum, and the abstraction of a little blood, was of little use; the operation ought only to be resorted to to relieve tension.—Dr. Travers, though always prepared to use the lancet, had never, during nineteen years, met with a case in which he had felt himself justified in doing so.—Dr. Ewart was a firm believer in the use of the lancet where it was absolutely required.—Mr. Drew believed that lancing the gums was indicated when there was an ordinary febrile condition, associated with pain in the gums for more than two days, and that it was indicated also in certain cases of diarrhea and bronchitis. He pointed out the possible connection between teething and suppuration of the middle ear.—Dr. De Havilland Hall believed that the necessity for using the lancet might generally be obviated by the exhibition of bromide of potassium.—Mr. Paramore inquired whether any evil effects had been traced to lancing the gums.—Mr. A. P. Gould believed that children, by sucking the incised gum, had placed themselves in danger from loss of blood.

Mr. Owen, in reply, commented on the great diversity of opinion brought out by the discussion, and thought this fact alone justified him in having brought the subject before the society.—*Reports Medical Society of London, in British Med. Journal.*

THE NEW LOCAL ANESTHETIC.—The *Record* of October 18 contains the reports of Drs. Agnew, Moore, and Minor, who, after experimenting with this drug in several most trying cases, express themselves with enthusiastic fervor in its praise. Cocaïne has been known since 1855, and is the active principle of the leaves of the erythroxylon coca, the well-known South American plant, now so generally prescribed as a stimulant. Cocaïne hydrochlorate is of more recent origin, and the anesthetic effect produced by its contact with mucous surfaces has been known only about a year, it having been used in Germany first by laryngologists to produce anesthesia of the vocal cords and surrounding parts to facilitate manipulation. The anesthetic effect of the topical application of the drug has been brought into greatest prominence by an experiment related by Dr. Noyes, the eminent New York oculist, who witnessed the production of complete anesthesia of the conjunctiva and cornea by the instillation of two drops of a two per cent. solution of Merk's cocaïne hydrochlorate (repeated in five minutes) into the patient's eye. Dr. C. R. Agnew, who has extensively followed Noyes's directions in his large ophthalmic clinics, has performed successfully perfectly painless operations for squint and cataract, and has examined injured and inflamed eyes with a freedom and ease otherwise unattainable without the use of this remarkable drug, or of a systemic anesthetic. The brilliant results which have invariably followed its application wherever employed, thus far, warrants its more extended trial, and, as the *Record* says, "it is quite certain that in those numerous cases in which local anesthesia is necessary for minor operations in surgery, gynecology, laryngology, otology, and even dentistry, this anesthetic will be tested. Especially would it seem to be indicated in those parts of the body which are covered by mucous membranes and plentifully supplied with sensitive nerves.—*New Orleans Med. and Surg. Journal.*

TOOTH IN THE ANTRUM OF HIGHMORE.—Dr. J. A. Wyeth presented one of the permanent teeth which he had removed from the antrum of Highmore in a woman 26 years of age, who had suffered from difficulty referred to that locality for about thirteen years, dating from an attack of measles or scarlet fever. A dentist had drawn a tooth, from the locality of which pus discharged from time to time for some years afterwards. Dr. Wyeth extracted two of the teeth, and entered the antrum for the purpose of cleaning it and establishing drainage, when he came upon the foreign body in the form of a tooth. It was the only authenticated case of the kind of which he had any knowledge. He asked the members if they had had a similar experience.—*Proceedings N. Y. Pathological Society, in Philadelphia Medical Times.*

PERILS OF CHLOROFORM ADMINISTRATION IN DENTAL OPERATIONS.—When a student at St. Bartholomew's Hospital I remember Dr. Brunton saying that, if a patient were not thoroughly under the influence of chloroform, any irritation of the fifth nerve would produce slowing of the heart's action, and finally stoppage through the pneumogastric nerve. He clearly showed us this by an experiment on a rabbit. Surely this may account for the untimely and lamentable death of Mr. Macdonald, a brother medical man, at Nottingham, and many others, from operations on the face and teeth. I have always acted on Dr. Brunton's view, and, if giving chloroform for an operation implicating the fifth pair of nerves, have pushed it until the patient is completely under its influence. I think this is a matter which, if more generally known, might save human lives.—*W. E. Buck, in the Lancet.*

CHROMIC ACID IN AFFECTIONS OF THE MOUTH.—Dr. Cauquil, writing to the *Bulletin Général de Thérapeutique*, concerning the employment of chromic acid, as recommended by Dr. Butlin in diseases of the tongue, states that he has also found it of value in stomatitis. He has used it with success in mercurial sore mouth, in the strength of one to five. In other cases of syphilitic pharyngitis, with hypertrophy of the tonsils, he has obtained good results with the same solution.—*Medical and Surgical Reporter.*

DENTAL CARIES IN NORMANDY.—From a foreign exchange we learn that several departments in Normandy furnish a considerable number of rejections among the recruits drawn from military service. The Seine Inférieure, for example, furnishes a mean of 50 per cent. of rejected conscripts. This singular fact in so wealthy a department, in which the population seems strong and prosperous, has excited the attention of Dr. Chervin. He finds that the most frequent malady giving rise to rejection, after cases of "general weakness," which preponderate, is dental caries, which, taking the department altogether, furnishes 15 per cent. If the different cantons in the department are examined a great difference among them is discovered, varying from 80 per 1,000, the lowest, to 229, the highest number. Pursuing his investigation of the department for twenty years, M. Chervin arrives at the conclusion that race is the chief cause of the predominance of caries. Examining one of the ethnic elements which is the most persistent, and which furnishes most information on the subject of race-stature, he finds that the department is inhabited by two different races, the shorter in the east, and the taller in the west. In the population of the higher stature dental caries is far more frequent than in that of the lower stature; and this fact is not peculiar to the Seine Inférieure, but is observed also in other departments.—*Medical and Surgical Reporter.*

THE DENTISTS' ACT.—The sheriff of Edinburgh has imposed a fine of £5 on a person charged with having, though not a registered dentist, during January last issued a circular in which he used words implying that he was registered under the Dentists' Act, and having, during part of last year, a brass plate on his front door bearing the word "dentist;" and also by an advertisement implying that he was registered.—*The Lancet.*

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HINTS AND QUERIES.

HYDROGEN PEROXIDE—HYDROGEN DIOXIDE—OXYGENATED WATER.—That "a little learning is a dangerous thing," is not more strikingly illustrated than on page 638 of the DENTAL COSMOS for October, in an article entitled "Inexact Notation." I was not aware that H_2O_2 was the *symbol* of peroxide of hydrogen—in the innocence of my heart I thought it was the *formula.* But everything is not as it seems. I am in the habit of using the terms "hydrogen peroxide" and "hydrogen dioxide" interchangeably, and such use is sanctioned by custom. In fact, if one were to read a dozen different articles consecutively in medical works and journals, it would most likely appear that the term "peroxide" is more often used than "dioxide;" but protoxide never. Definition: "A compound of one equivalent of oxygen with one equivalent of a base, and destitute of acid properties."—Webster.

The writer of the article, "Inexact Notation," appears to desire to set me on the right track for studying chemical notation; but when he jumbles things so as to make it appear that H_2O_2 is HO, then I say with becoming humility that chemistry knows no combination of HO pure and simple. The elements under consideration do not thus combine. Such mixing up of old and new nomenclature by one who professes to correct "gives wrong impressions to the young (to which class I belong), and misleads the old * * * who are *not* well versed in chemical notation." A brief reference to H_2O_2 is herewith appended:

"Fownes's Chemistry," edition of 1871, Henry C. Lea, page 153: "Formula, Hydrogen Dioxide, O_2H_2. Hydrogen dioxide contains exactly twice as much oxygen as water, or 16 parts to 1 part of hydrogen."

National Dispensatory, edition of 1880, Stillé and Maisch, page 745: "*Hydrogenii Peroxidum*—Peroxide Hydrogen; formula, H_2O_2. Composition: Peroxide of hydrogen is the *binoxide* or dioxide of hydrogen, H_2O_2, and has also been viewed as a hydrate of oxygen, OH_2O. The oxygen which is given off under the conditions mentioned above has been regarded by Schönbein and others as a peculiar modification, which has been called *positive oxygen* or *antozone*, to distinguish it from *ozone*, or oxygen in the negative condition. The correctness of these distinctions, however, is denied by many investigators."

"Barker's Chemistry," octavo edition, 1870, John P. Morton & Co., Louisville, page 133: "Hydrogen Peroxide—Free Hydroxyl; formula, H_2O_2. Graphic, H—O—O—H. History: Hydrogen peroxide was discovered by Thenard in 1818, and called by him oxygenated water. * * * It is always formed by slow oxidation in presence of moisture; the antozone thus produced uniting with the water to give hydrogen peroxide, which may be detected in the liquid. Hydrogen peroxide is a colorless, syrupy liquid, of specific gravity 1.452. It does not solidify at —30°, and may be evaporated in vacuo unchanged."

"Materia Medica and Therapeutics of Inorganic Substances," Phillips, edition of 1882, W. Wood & Co., volume i., page 16: "Hydrogenii Peroxidum—Peroxide of Hydrogen; H_2O_2; molecular weight, 34. Characters: This compound of hydrogen is a liquid of the consistence of syrup, of strong, disagreeable metallic taste; very unstable, and readily parting with its oxygen; hence, it is a powerful oxidizer. It blanches a solution of litmus. A solution (of specific gravity 1.006) is in common use abroad (on the Continent of Europe) for bleaching purposes, and is said to be permanent."

"Bloxam's Chemistry," edition of 1883, Blakiston, page 53, paragraph 48: "*Peroxide of Hydrogen* or *Hydric Peroxide*, H_2O_2. * * If Hydric peroxide, even in diluted solution, be added to potassium permanganate, acidified with sulphuric acid, the red color is entirely destroyed, and bubbles of oxygen are evolved, causing effervescence; $K_2Mn_2O_8+3\,H_2SO_4+5\,H_2O_2=K_2SO_4+2\,MnSO_4+8\,H_2O+5\,O_2$. Here O_5 from the hydric peroxide has united with O_5 from the permanganate. These experiments" (alluding to preceding ones) "support the conclusion arrived at by the reasoning at page 2, that the molecule or ultimate physical particle of oxygen is really composed of 2 atoms."

"Encyclopædia Britannica," ninth edition, volume 5, page 424: "Hydrogen Dioxide, H_2O_2, * * * Hydrogen dioxide, it will be evident, differs materially from hydrogen monoxide or water. Its instability, and its tendency to enter into reaction with other bodies with separation of oxygen, appear to be explained by the fact that its decomposition into water and oxygen is attended with the development of a very considerable amount of heat."

The writer of the "correction" seems to forget that H_2O_2 as it comes to the dentist is in *aqueous* solution, and never contains more than three to four per cent. of peroxide, and in consequence of this it may be used *freely* in a tooth, in the mouth, on a metallic filling, and anywhere, without "blowing up" the dentist, his patient, or the building which he inhabits. *Damnant quod non intelligunt.*—A. W. Harlan.

Peroxide or Protoxide ?—It seems to me that Drs. Kirk and Peterson have either overlooked the fact or failed to perceive that, in the composition of water, it requires precisely two measures of hydrogen to combine exactly with one measure of oxygen; and, being taught to believe that equal volumes of all the gases contain the same number of molecules, therefore there must be in any given weight of hydrogen the same number of molecules as there are in sixteen times as much oxygen by weight. From this I am constrained to believe that H_2O is a suboxide, and because of this I am justified in maintaining the position that H_2O_2, instead of being a *per*oxide (according to the old formula), is really the protoxide.—W. J. Hewes, D.D.S.

Hydrochlorate of Cocaïne for Obtunding Sensitive Dentine.—My specialty being operative dentistry, I am naturally greatly interested in anything that obviates the dread of my patients of the engine drill. I have experimented with most of the preparations known to the dental materia medica for obtunding sensitive dentine with indifferent success. When the new local anesthetic (hydrochlorate of cocaïne) was made known I immediately procured a two-drachm bottle (price $2.00) of a four per cent. solution, and my experiments with it so far have been very satisfactory, although I think better results can be obtained from a stronger solution. With me its application as an obtunder of sensitive dentine has marked a new era of progress in this direction. One of my patients was a married lady, aged twenty-four, with extremely sensitive dentine. After applying stimulants and sedatives without effect, I tried the cocaïne. Adjusting the rubber-dam, a small pledget of Japanese paper, saturated with the solution, was packed into the cavity, and left for a short time. Upon removing it the engine burr was used, and to the delight of patient and operator the excavating was performed without pain. Three cavities were prepared for filling in like manner, two applications of the anesthetic being made to the larger of the cavities. It is a great pleasure to send you these tidings of success, and to add a tribute of thanks to the man who discovered this agent for alleviating suffering.—W. P. Horton, Jr., *Cleveland, O.*

Cocaïne Hydrochlorate.—As this substance is attracting considerable attention as a local anesthetic for the eye, it may occur to dentists to try it for sensitive dentine. As I do not find it of any special value for this purpose, it may be worth while to mention the fact, as it is very expensive, costing one dollar a grain, and some one may be prevented from experimenting with so costly and comparatively useless a substance for this purpose.—W. H. R.

Clattering Teeth.—In the Dental Cosmos for May of the present year I noticed some suggestions for preventing clattering of artificial teeth. I have thought that a method which I adopted about two years ago, with entire success, may have merit enough to make it of interest to others.

In arranging the teeth for a lower set, if clattering is apprehended, I grind only enough from the gums to make joints between the cuspids and first bicuspids on either side, leaving those teeth rather wide apart; then, with a thin, round-edged corundum wheel, I grind a half-circle downward in the direction of the length of the teeth in the side of each of the cuspids and first bicuspids; making a round hole downward between these teeth on each side of the set. I then grind a slot downward and backward between the first and second molars, commencing of course between the two inside pins, and making the slot as wide as may be without encroaching too much upon the domain of the pins, and grinding so nearly through the section as to leave the teeth connected only by the thickness of the gum. All of these apertures I allow to fill up with rubber when the case is packed. If when the teeth are worn no clattering takes place, nothing further need be done; but if the contrary is the case, I drill holes down through the rubber and plate where the apertures were ground, and draw in—moderately snug—soft vulcanized rubber, leaving it even with the lower surface of the plate, and allowing the upper end to protrude a little above the grinding surfaces of the teeth. Whenever necessary (which will be only about once in two months) the wearer can with a pair of toilet tweezers draw up the elastic and trim the end; continuing to do so until the elastic is used up, when a new one may be drawn in. By this method a perfect occlusion of the teeth is permitted without clattering.—Wm. F. Childs, *Manchester, N. H.*

To the Editor of the Dental Cosmos:

A gentleman, under the imposing title of "Dental Law," has taken up the cudgel for the defense of the new Maryland dental law, in the November number of the Dental Cosmos. A law that cannot call out a more logical defence than this gentleman makes for it is certainly a weak one.

If the parties who formulated this remarkable law were so anxious to sift the "wheat from the chaff," why did they not frame a law that would require an examination from the large number already in the State who held no diplomas before they could continue to practice under the new *régime?* In other words, a person, without education or training of any kind, but being the possessor of a pair of forceps and a vulcanizer, could have come into this State one day previous to the law going into effect, and he would have been allowed to continue practice under the new law by paying a registration fee, and making affidavit that he had practiced here before the law went into force. I ask all fair-minded men if that is the way to sift wheat from chaff? Evidently the gentlemen who framed this law are not brilliant reformers.

"Dental Law" dogmatically says that this law is not unjust or malicious, though so termed because it recognized only Maryland diplomas. In the last part of his communication he says that the State examiners do not "think that, in fairness and justice to the profession, even those holding Maryland diplomas should be exempt." Now, that is precisely what has been claimed. The gentleman forgets what he is writing about. Another contradiction appears when he says that the law refuses to recognize diplomas issued by schools outside of the State, and in the next sentence makes the assertion that it does not condemn these colleges. If refusing to recognize a college diploma is not condemning the school, the gentleman interprets the English language differently from the balance of the nation.

This law does not place the dental colleges outside of the State "*theoretically*" in one class. It places them there *actually*, and says it can not accept their diplomas, but requires an examination of the parties who possess them before they may practice in this State. No other interpretation can be put upon the law, and it is so understood by prominent attorneys. There is no room left for the "discriminating" that the gentleman writes about.

"Dental Law" considers it a sufficient reason for the new law to exempt Maryland diplomas because these schools are chartered by the same body that passed the law. The notorious Buchanan college held a charter from the State Legislature of Pennsylvania, and if the idea that is entertained by "Dental Law" is true, that infamous diploma mill's graduates could not have been brought to justice in Pennsylvania. Certainly a legislature has a right to pass laws authorizing the investigating of the character of the schools chartered by it, and the punishing of abuses of their power.

The Maryland dental law was conceived in a spirit of spite, and does not command the respect of a large number of the educated dentists of our State. Let "Dental Law" beware that it does not prove a *boomerang*, working more harm than good to the cause of dental education. The gentleman suggests that this law only "pinches those who avoid its scope and range." The fact is that the acquiring of one's dental education outside of the little State of Maryland is that which is considered to be avoiding the scope and range of the law.—Justice.

I saw, at least twelve years ago, such a mask as Dr. Meyer describes in the November number of the Dental Cosmos. It was made, I think, by Loomis, of Washington, D. C., and was of continuous-gum.—J. B. Hodgkin.